

3/6/89

CONTRACT FOR ENGINEERING
CONSTRUCTION & INSTALLATION WORK
ON
CEDAR CHEMICAL CORPORATION PLANT
Location: West Helena, Arkansas

This Contract made and entered into as of the 10th day of March, 1989, by and between DELTA PROCESS MANAGEMENT, INCORPORATED ("Contractor"), a Tennessee Corporation organized and existing under the laws of the State of Tennessee, with a principal place of business at 1985 Nonconnah Boulevard, Memphis, Tennessee 38132, and CEDAR CHEMICAL CORPORATION ("Owner"), a Delaware Corporation with offices at Suite 2414, Clark Tower, 5100 Poplar Avenue, Memphis, Tennessee 38137.

The Contractor and Owner agree as follows:

ARTICLE I - ENGINEERING-CONSTRUCTION UNDERTAKING

1.1 CONTRACTOR'S COMMITMENT

The Contractor shall perform all engineering, design, procurement, and construction necessary to carry out and complete the "Work" as defined in Article 1.4, and construct and complete the "Project" as defined in Article 1.2 in strict accordance with the "Contract Documents" listed in Article 1.3.

1.2 THE PROJECT

The Project consists of the turnkey design and construction necessary to modify the Cedar Plant manufacturing facilities at West Helena, Arkansas in accordance with the Contract Documents to enable Cedar to produce products for W.R. Grace & Company ("Grace") in accordance with provisions of an Agreement between Cedar and Grace dated MARCH 10, 1989 _____ (the "Grace Contract"), said modifications to meet all specifications contained in the plans and drawings specified in the Contract Documents referred to herein.

9351977



CONSTRUCTION CONTRACT

ARTICLE I (Continued)

1.3 CONTRACT DOCUMENTS

The Contract Documents consist of the following items, all of which are incorporated in this Contract by reference:

This Contract;

Owners General Conditions set out in Schedule 1 to this Agreement;

Change Order form attached as Schedule 2 to this agreement;

The Grace Contract attached hereto as Exhibit A;

Delta Process Management, Inc. Drawings dated January 30, 1989 attached hereto as Exhibit B;

All Addenda to Drawings and Specifications as shall hereafter be approved in writing by Cedar and Grace and designated Supplemental Contract Documents (including all engineering plans and drawings, and also including final as-built plans to be delivered by Contractor to Cedar upon completion of the Work);

Grace's Process Flow Diagrams attached hereto, are incorporated by reference in, Exhibit B to this Agreement;

The Construction Schedule, attached hereto as Exhibit C;

The Equipment Lists, attached hereto as Exhibit D.1, List of New Equipment to be provided by Contractor, Exhibit D.2, List of Existing Equipment at West Helena, to be relocated by Contractor, and Exhibit D.3, List of Existing Equipment at Vicksburg, to be relocated to West Helena by Contractor;

Inspection Procedures, attached hereto as Exhibit E;

Schedule of Anticipated Payments by Contractor, attached hereto as Exhibit F;

ARTICLE I (Continued)

Prime Contractors Scope of Work, attached hereto as Exhibit G.

1.4 THE WORK

The Contractor shall furnish all professional design services, labor, supervision, materials, equipment, tools, services, and all other items necessary or proper for completion of the Project, in accordance with the Contract Documents, all of which is called the "Work", as defined in Exhibit G.

1.5 COMMENCEMENT AND COMPLETION DATES

The Contractor shall commence the Work not later than March ^{8/10}~~8~~, 1989; pursue the Work with all due diligence in accordance with the Construction Schedule attached hereto; and complete the Project in order to enable Cedar to initiate a Plant Start-Up (as ^{8/10}~~that~~ term is defined in the Grace Contract) not later than December ^{8/10}~~8~~, 1989. In the event Owner shall become liable to Grace for "delay fees" pursuant to the Grace Contract as a result of Contractor's failure to complete the Project within the time specified herein, Contractor shall pay to Owner such delay fees upon demand. In the event the Contractor shall complete the Project as defined in this Section on or before November 10, 1989, the Contractor shall be paid an "Incentive Fee" of \$25,000.00.

1.6 TIME AND DELAYS

Time is of the essence for all commencement and completion dates set forth above. If the Contractor's Work is delayed by the act, neglect, delay or default of the Owner, or of any other contractor employed by the Owner, or for other reasons beyond the reasonable control of the

CONSTRUCTION CONTRACT

ARTICLE I (Continued)

Contractor, or by additions, deletions, or alterations in the Work ordered in writing by the Owner, the Contractor shall initiate a recovery plan and shall use its best efforts to minimize its effect on the completion date. The Contractor recognizes that a delay in any one phase of the Project does not necessarily result in any delay or a delay of equal duration in completion of the entire Project. If, as a result of events or circumstances beyond the reasonable control of Contractor (other than strikes or labor disputes) and not as a result of the Contractor's default in its undertakings hereunder, it is not possible for the Contractor to achieve the above completion date without incurring additional costs which the Owner is not willing to assume, the Owner ^{shall reasonably consent to} ~~and Contractor shall agree on~~ extending such completion date or dates as may be necessary, but for no greater period than the period of the unavoidable delay. To be granted any such extension of time, the Contractor must give notice in writing to Owner within seven (7) calendar days from when the event causing the unavoidable delay occurs.

ARTICLE II - CONTRACT PRICE

2.1 LUMP SUM

The Owner agrees to pay and the Contractor agrees to accept as full payment for performance of the Work and completion of the Project the lump sum amount of Two Million Nine Hundred Eighty-Nine Thousand Seven Hundred Sixty Dollars (\$2,989,760.00), less credits in the amount of the agreed sums identified in Exhibits D.1 and D.3 attached hereto

ARTICLE II (Continued)

with respect to items of equipment which Cedar will supply to the Contractor, and subject to additions and deductions as herein provided.

2.2 CEDAR-OWNED EQUIPMENT

It is agreed that the equipment to be provided by Cedar hereunder identified in Exhibits D.2 and D.3 shall be inspected by the Contractor in accordance with the procedures attached hereto as Exhibit E, and the results shall be delivered to Cedar as promptly as practicable following the effective date of this Agreement. Cedar shall be responsible for cleaning out all used reactors, tanks, and other vessels and dismantling such equipment as included in the equipment list attached hereto. The Contractor shall be responsible for removing all of the Cedar-Owned Equipment from its present location, (with the exception of new equipment purchased and supplied by Delta as shown on Exhibit D.1); moving it to Cedar's West Helena, Arkansas Plant; refurbishing it; and re-installing it at the Project, the cost of all of which is included in the aforesaid contract price.

ARTICLE III - CHANGES

3.1 CHANGES IN THE WORK

The Owner may order additions, deletions, revisions or other changes in the Work within the general scope of the Contract Documents, and if such changes will materially affect the cost of the Project or the time required for completion of the Work, this Contract shall be equitably adjusted. Any such changes shall be documented by use of

ARTICLE III (Continued)

the Change Order ("CO") form, attached as Schedule 2, and the Owner shall be under no obligation to either pay for costs or extend agreed-upon completion dates applicable to any changes in the Work in the absence of an appropriate CO approved by the Owner.

3.2 COMPUTATIONS

The Contractor shall provide the Owner with a cost estimate supporting any CO requiring adjustment of the Contractor Price, such estimate to include quantities of labor, materials, rental equipment, etc., to be added to or deleted from the Work, plus any other details required by the Owner to reasonably ascertain the appropriateness of the proposed adjustment in the Contract Price. Any increase or decrease in the Contract Price resulting from a change shall be computed by the following methods.

Detailed cost estimate as follows:

- a. For work performed by Contractor's own forces, prices shall be based upon the sum of (i) direct productive costs (field labor costs, including applicable employee benefits but exclusive of the premium portion of any overtime; direct materials and additional equipment rentals if required by the change); (ii) Contractor's field overhead (all field supervision above the level of working foremen, timekeeping, clerical, and other unallocated field costs), home office overhead and profit, computed at fifteen percent (15%) of (i) direct productive costs; and (iii) the premium portion of any overtime paid, including applicable employee benefits.

CONSTRUCTION CONTRACT

ARTICLE III (Continued)

b. For work performed by subcontractors, estimates shall be computed as the sum of (i) net price to Contractor of the subcontractor's work, this price to be fully detailed to indicate estimated field labor, direct materials, additional equipment rental costs if required by the change, field overhead and home office overhead and profit for the subcontractor (such overhead and profit not to be applied to the premium portion of any overtime); (ii) Contractor's field overhead (all field supervision above the level of working foremen, timekeeping, clerical, and other unallocated field costs), home office overhead and profit, computed at twenty-five percent (25%) of (i) net price to Contractor of the subcontractor's work, less the premium portion of any overtime.

c. The Contract Price shall be adjusted to compensate the Contractor for Professional Design Services necessitated by Owner requested revisions to the Work.

These services may be performed by the Contractor's forces or independent consultants. Prices shall be based upon the sum of direct productive costs including employee benefits.

d. Any change orders in excess of \$15,000.00 shall require three (3) competitive subcontractor bids.

3.3 AMENDMENT OF THE CONTRACT

The Owner shall prepare and the parties shall execute Amendment(s) to the Contract on the basis of approved Change Order forms. The Contract Price shall be adjusted accordingly and the Work shall be

ARTICLE III (Continued)

performed in accordance with the terms and conditions of this Contract.

ARTICLE IV - PAYMENT

4.1 REQUISITION FOR PAYMENT

Contractor shall invoice Owner on or before the first Monday of each month for payment of materials furnished and work performed ^{including any} during the preceding month or part thereof. *CO's*

4.2 OWNER'S OBLIGATION

Upon approval of the Requisition for Payment, the Owner shall pay Contractor ~~ninety five percent (95%)~~ ^{NINETY-TWO AND ONE HALF PERCENT (92.5%)} of the amount requested within ~~fifteen (15) days~~ ^{twelve (12) days}. Approval or disapproval shall be made and delivered to Contractor within 5 days of Owner's receipt of Requisition For Payment or approval shall be presumed. If disapproved, Owner shall identify all deficiencies in writing. (See Below)

4.3 FINAL PAYMENT

Upon completion of the Project, as defined in Article 1.5, the Contractor shall immediately submit to the Owner (a) a Requisition for Payment clearly identified as the final requisition, covering the balance due under this Contract; (b) an affidavit that all payrolls, bills for materials and equipment, and any other indebtedness connected with the Work for which the Owner might in any way be responsible have been paid or otherwise satisfied, or will be paid out of the balance due under the Contract; (c) consent of surety, if any, to final payment; (d) all warranty and guarantee documents required in connection with the Work; and (e) waivers of lien in full. If any subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor shall furnish a bond satisfactory to Owner to indemnify him

* In addition, Owner shall pay to Contractor within 15 days, the following amounts; (1) 1/3 of accrued retainage upon the Work being 50% completed, if based on Contractor's projected cost estimate to complete the Project is within budget, and (2) the balance as set forth in Section 4.3.2

ARTICLE IV (Continued)

against any such lien. Within twenty (20) days of the completion of the Project, and any Punch List Items, the Owner shall release the retainage to Contractor, and make final payment to Contractor.

4.4 CONTRACTOR CERTIFICATION

The submission of a Requisition for Payment shall constitute a certification by the Contractor that all of the said costs have been paid or shall be paid within thirty (30) days of the requisition date or ten (10) days after payment by Owner, whichever is later.

ARTICLE V - TERMINATION

5.1 TERMINATION FOR CAUSE

A. Definition of Cause

Should the Contractor repeatedly fail to prosecute the Work with reasonable promptness and diligence, or fail to make prompt payment to subcontractors or for material or labor, or repeatedly fail or refuse to supply a sufficient number of skilled workmen to meet schedule or materials of the proper quality, or become insolvent or be unable to pay its debts as they mature, or make a general assignment for the benefit of creditors, or if a receiver should be appointed for the whole or any substantial part of Contractor's property, or if Contractor should become in any way the subject of a bankruptcy petition, or if Contractor defaults in the performance of any other material provision of this Contract, Owner may, in addition to all other rights and remedies provided by law, terminate this Contract for "cause" by giving Contractor

ARTICLE V (Continued)

at least seven (7) days prior written notice thereof. In the event the Contractor shall correct the cause giving rise to the notice within such seven (7) day period, the cause of termination shall be deemed void and this Contract shall continue in effect.

B. Completion and Payment

Should this Contract be terminated for cause, the Owner may take possession of the premises and all or any part of the materials and equipment delivered or in transit to the job site, and complete the Work by whatever method and means it may deem expedient. In such an event, Contractor shall not be entitled to any further payments until the Work is completed, at which time Contractor shall prepare a statement of cost to date of termination, plus all obligations incurred in the interest of the Work but not yet due and all reasonable costs incurred at Owner's request after termination. The net amount of such statement shall become due and payable when approved by the Owner after completion of the remainder of the Work by the Owner or its agents. Notwithstanding the foregoing, in no event shall the total payments made to the Contractor plus the cost and expense incurred by the Owner in completing the work exceed the Contract Price, and should the cost and expense incurred by Owner in completing the Work exceed the difference between the total payments made to Contractor and the Contract Price, Contractor shall pay such excess to Owner upon demand.

CONSTRUCTION CONTRACT

ARTICLE V (Continued)

5.2 TERMINATION

If the work is stopped for a period of 30 days under an order of any court or by the action or inaction of any public authority having jurisdiction, through no fault ~~of~~ Contractor or a subcontractor, or their agents or employees, ^{or} ~~of~~ in any other persons furnishing any materials or performing any work under a contract with Contractor, or if the work should be stopped for a period of 30 days by Contractor for the Owner's failure to make the payments as called for in the contract, or if Owner defaults in the performance of any other material provision of this Contract, or if Contractor is prevented from entering onto the real estate by the Owner thereof, then Contractor may, on 7 days written notice to Owner or its representative, terminate the contract and recover from Owner payment for all materials furnished and work performed and for any proven loss sustained upon any materials, equipment, tools, construction equipment and machinery or other or other items, including reasonable profit ^{equal to 5% of the unpaid portion of the Contract Price,} and ~~reasonable attorneys fees actually incurred to collect said~~ ^{sum.} In the event of termination as aforesaid, Contractor shall have the right to any materials which have not been incorporated into the construction.

ARTICLE VI - MISCELLANEOUS PROVISIONS

6.1 CONTRACT ADMINISTRATION

Administration of this Contract will be handled for Owner by Mr. William J. Eissler, Jr., Vice President and General Manager, with full authority to approve, authorize and execute all modifications or amendments thereto.

ARTICLE VI (Continued)

6.2 SUCCESSORS AND ASSIGNS

This Contract and every covenant, condition and provision of the Contract Documents shall work to the benefit of and be binding upon the Owner and the Contractor, and each of their respective successors and permitted assigns. The Contractor shall not assign, transfer or sublet his interest in or obligations hereunder without the express written consent of the Owner.

IN WITNESS WHEREOF, the Owner and the Contractor have made and executed this Contract as of the day and year first written above.

CEDAR CHEMICAL CORPORATION
(Owner)

DELTA PROCESS MANAGEMENT, INC.
(Contractor)

BY: [Signature] Date: 3-10-89

Title: Vice Pres. & Gen. Mgr.

BY: Jim E. Fowler Date: 10 March 89

(Jim E. Fowler)
Title: President

6.3 APPLICABLE LAW

This contract is executed and enforceable in Tennessee and shall be interpreted under the laws of such state.

[Signature] [Signature]

OWNER'S GENERAL CONDITIONS
SCHEDULE 1

1. Payment and Performance Bond - ~~On or before April 15, 1989, the~~
MAKE ITS BEST EFFORT TO
Contractor shall [^]arrange for and deliver to Cedar a Payment and Performance Bond in the amount of the Contract Price stated herein, with good and sufficient corporate surety, and in form and substance reasonably acceptable to Cedar, assuring the Contractor's due performance pursuant to this Agreement and its prompt payment of all persons having just claims for labor, materials, services, supplies, machinery, equipment rentals, and the like furnished for use or consumed in connection with the Contractor's performance of Work in accordance with this Agreement; provided that Cedar shall reimburse Contractor for the premium for such bonds, ~~in an amount of~~

\$ _____

2. Insurance - Throughout the term of this Agreement, the Contractor shall maintain in full force and effect comprehensive general liability insurance with limits of not less than \$1,000,000.00 per occurrence, as well as workers' compensation insurance coverage required by law with respect to all employees of the Contractor engaged in work on the Project.

3. Confidentiality - The Contractor shall continue to be bound by and comply with the terms of the Confidentiality Agreement entered into between the Contractor and Cedar on March 8, 1988, the provisions of which pertain to all confidential information supplied hereunder by Grace and Cedar, including process information and process flow diagrams, and specifically including the process and instrumentation diagrams identified in Article 1.3.

4. Warranties - The Contractor represents and warrants that all material and equipment furnished by it and its subcontractors in connection

Page Two
OWNER'S GENERAL CONDITIONS
SCHEDULE 1

with the Project shall be free from defects in workmanship and shall meet any applicable specifications contained in the Contract Documents. The Contractor makes no warranty with respect to the condition of equipment to be provided by Cedar (identified in Exhibit D to the Contract) except that the Contractor shall have carried out the inspection procedures identified in Exhibit E with respect to such equipment, and that the reports of such inspections shall have been correctly reported to the Owner, all consistent with reasonable care and industry standards. The Contractor also represents and warrants that all work performed by it in connection with the Project, including installation of equipment (whether furnished by the Contractor or by the Owner) shall be carried out in a workmanlike manner consistent with good engineering practices. The Contractor shall be responsible for replacing and re-installing, without cost to Cedar, any material or equipment furnished by the Contractor, or any work carried out by the Contractor in connection with the Project which shall prove to be defective within one (1) year following completion of the Project. The Contractor shall also assign to Cedar all manufacturers' warranties with respect to equipment furnished in connection with the Project.

5. Compliance With Law - The Contractor represents and agrees that it is familiar with and will comply with all federal, state, and local laws, rules and regulations which may be applicable to its completion of the Project in accordance with the Contract Documents.

6. Subcontracts - It is recognized that certain phases of the Project shall be carried out by subcontractors engaged by the Contractor. As soon as practicable following the effective date of this Agreement, the

Page Three
OWNER'S GENERAL CONDITIONS
SCHEDULE 1

Contractor shall supply to Cedar the names of each subcontractor which it proposes to employ or engage in connection with the Project. The Contractor shall not employ any subcontractor to whom Cedar may have a reasonable objection. Contracts between the Contractor and any such subcontractor shall be in accordance with the terms of this Agreement and shall include all provisions hereof, including requirements for bonding, insofar as applicable.

7. Indemnification - The Contractor shall indemnify Cedar and hold it harmless from and against all claims, damages, losses and expenses, including attorneys' fees arising out of or resulting from the Contractor's performance hereunder, including work performed by any subcontractor of the Contractor performing services or providing materials or equipment hereunder, except to the extent that such claims, damages, losses or expenses shall arise out of the negligent or willful acts of Cedar or of its agents or employees.

8. Assignment/Binding Effect - Neither party shall assign its rights or obligations under this Agreement without the prior written consent of the other party. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and duly authorized assigns.

CHANGE ORDER
SCHEDULE 2

Attention: _____
Project No.: _____

Location: _____
Date: _____

Design Change No.: _____

The following described work will increase the design cost by the estimated amount of \$ _____. The breakdown by discipline and hours is as follows:

<u>DISCIPLINE</u>	<u>HOURS</u>	<u>COST</u>
Design	_____	_____
Structural	_____	_____
Mechanical	_____	_____
Electrical	_____	_____
Landscape, Site	_____	_____
Specifications	_____	_____
Other _____	_____	_____
TOTAL	_____	_____

1. DESCRIPTION OF CHANGE _____

2. REASON FOR CHANGE _____
a) Changes in design requested by _____
b) Field Conditions _____
3. ESTIMATED EFFECT ON CONSTRUCTION COST (if any, details attached)
increase (decrease) _____
4. ESTIMATED EFFECT ON CONSTRUCTION SCHEDULE (if any, details attached)
increase (decrease) _____

Please sign in the space provided below and return one (1) copy to the undersigned in order that we may proceed with work. Costs incurred in making the changes will be in accordance with Article III of the Agreement.

The cost of this change
Will _____
Will Not _____
be borne by W.R. Grace in
accordance with Article 3.2

(Engineer - Contractor)
Delta Process Management, Inc.

Per _____ (Date) _____
(for W.R. Grace)

(Owner)
Cedar Chemical Corporation

Page Two
EXHIBIT B

#D-078FS-02, Revision B
NITROPARAFFIN DERIVATIVES PROJECT TA PROCESS FLOWSHEET, PAGE 1

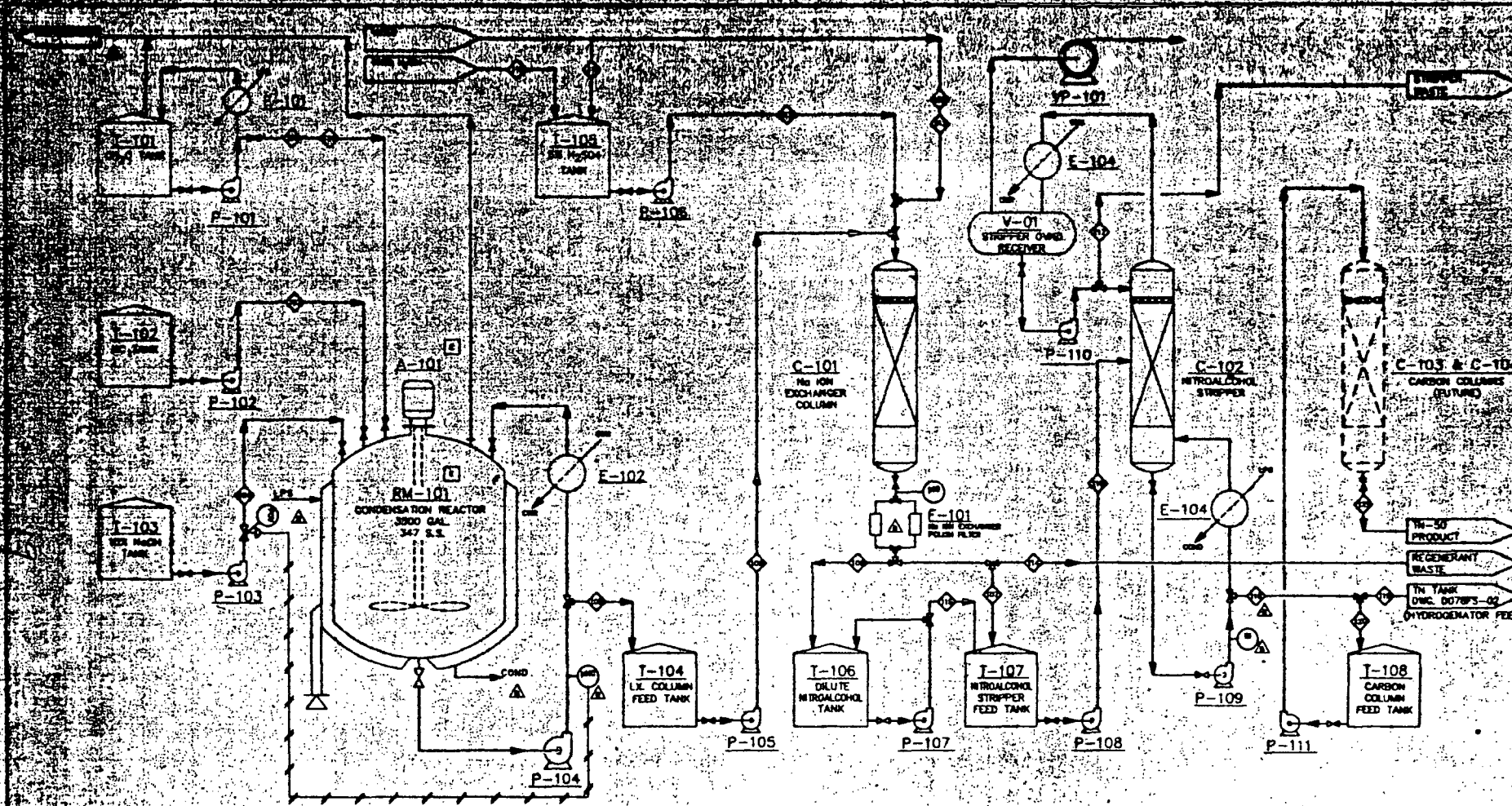
#D-078FS-03, Revision B
NITROPARAFFIN DERIVATIVES PROJECT TA PROCESS FLOWSHEET, PAGE 2
(PRELIMINARY)

#D-078FS-04, Revision C
NITROPARAFFIN DERIVATIVES PROJECT 2NB PROCESS FLOWSHEET

#D-078FS-05, Revision B
NITROPARAFFIN DERIVATIVES PROJECT 2AB PROCESS FLOWSHEET

#D-078FS-06, Revision C
NITROPARAFFIN DERIVATIVES PROJECT NMP PROCESS FLOWSHEET

#D-078FS-07, Revision C
NITROPARAFFIN DERIVATIVES PROJECT AMP PROCESS FLOWSHEET



COMPONENT	WGT	LBS/DAY (1.4 BATCHES/DAY)										LBS/DAY (1.4 BATCHES/DAY)									
		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
CHLOR	30.0	684.0	8499.0	0.0	0.0	156.0	229.7	226.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.1	229.7	229.7	0.0	0.0	0.0
NPO	18.8	840.0	11804.0	7.0	336.0	18067.0	19320.1	19295.1	3140.5	2992.9	12.6	3197.4	3210.0	14654.2	17861.0	2992.9	22488.0	10954.3	11533.7	11533.7	0.0
CHLOR	32.0	31.0	441.0	0.0	0.0	472.0	896.4	896.9	0.0	9.4	0.0	0.0	0.0	0.0	0.1	9.4	896.4	896.9	7.4	7.4	0.0
W-1	61.0	0.0	0.0	8781.0	0.0	66.0	100.1	99.0	0.0	1.1	0.0	0.0	0.0	0.0	TRACE	1.1	100.1	99.0	41.1	41.1	0.0
W-2	18.0	0.0	0.0	250.0	0.0	3.1	4.6	4.3	0.0	0.1	0.0	0.0	0.0	0.0	TRACE	0.1	4.3	4.6	2.0	2.0	0.0
W-3	88.0	0.0	0.0	34.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	TRACE	0.0	0.0	0.0	0.0	0.0	0.0
W-4	40.0	0.0	0.0	0.0	37.0	37.0	34.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W-5	181.1	0.0	0.0	0.0	0.0	18462.0	24302.1	23969.2	0.0	326.6	0.0	0.0	0.0	0.0	18.9	326.6	24302.1	24302.1	24137.8	24137.8	0.0
W-6	130.1	0.0	0.0	0.0	0.0	439.0	647.9	636.4	0.0	9.0	0.0	0.0	0.0	0.0	0.5	9.0	647.9	636.4	634.2	634.2	0.0
W-7	119.1	0.0	0.0	0.0	0.0	47.0	66.3	67.4	0.0	1.1	0.0	0.0	0.0	0.0	TRACE	1.1	66.3	67.4	2.1	2.1	0.0
W-8	98.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	166.6	0.0	159.6	0.0	191.1	0.0	0.0	0.0	0.0	0.0	0.0
W-9	142.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	98.0	0.0	0.0	0.0	0.0	0.0	0.0
W-10	0.0	0.0	64.0	0.0	341.0	603.6	496.2	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.3	7.1	603.6	496.2	503.6	503.6	0.0
TOTAL	1865.0	22044.0	7136.0	373.0	31112.6	45928.4	45784.0	31420.5	3247.1	181.2	2197.4	3378.6	14654.2	18078.1	3250.2	98122.6	12196.8	36828.3	36828.3	36828.3	0.0
W-11 (W-1)	186.5	2360.2	783.7	40.2	3000.3	4423.0	4432.1	378.8	372.4	12.2	263.4	282.9	1787.1	2126.9	372.7	4787.1	1471.8	2400.2	2400.2	2400.2	0.0
W-12 (W-2)	39	39	20	20	39	39	39	20	20	20	20	20	20	20	20	20	20	20	20	20	0.0
W-13 (W-3)	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	0.0
W-14 (W-4)	9.34	9.34	9.47	9.29	10.37	10.37	10.33	8.34	8.72	14.81	8.34	8.60	8.34	8.46	8.72	10.24	8.29	10.86	10.86	10.86	0.0

APPROVED
W. B. GRACE - CONN.
DATE: 12-15-77

DELTA PROCESS MANAGEMENT INC.

1700 W. 10th St., Suite 100, Oklahoma City, OK 73106

Phone: (405) 521-1111

FAX: (405) 521-1112

TELETYPE: (405) 521-1113

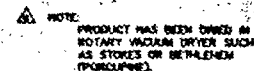
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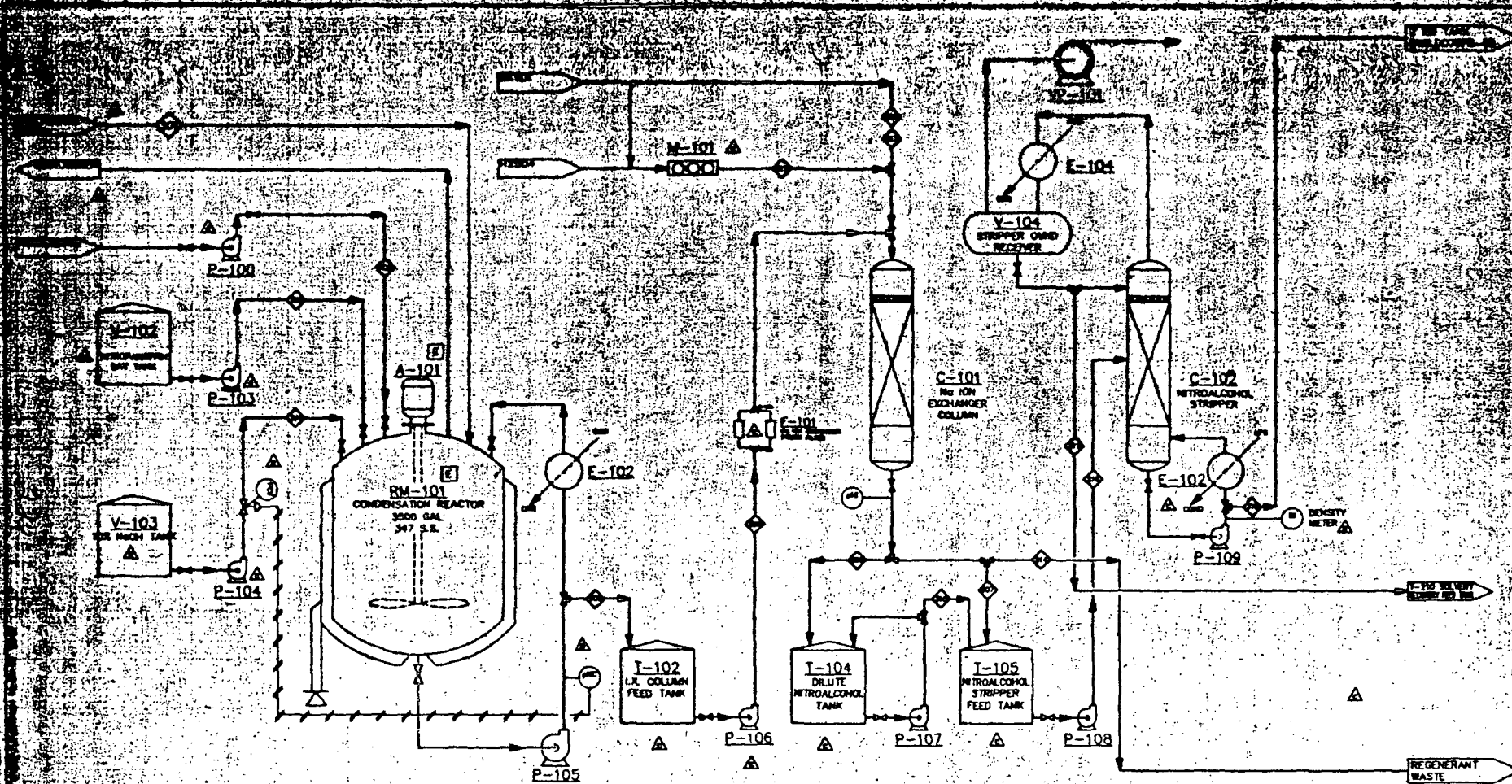
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CEDAR CHEMICAL
 WEST-ALABAMA
 TA PROCESS FLO
 500,000 LB/MONTH
 NITROPARAFFIN



APPROVED
W. R. GRACE - CONN



	LBS/BATCH										LBS/DAY 3.19 BATCHES/DAY									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. REACTOR	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2. REACTOR	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
3. REACTOR	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
4. REACTOR	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
5. REACTOR	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
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17. REACTOR	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
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APPROVED
W. R. SPACE - CONN
DATE 5/1/77

CEDAR CHEMICAL

278 Process Flow sheet

NITROARTERIAL DERIVATIVES PREPARED

DELTA PROCESS MANAGEMENT INC.

1000 W. 10th St. - Suite 100 - Des Moines, IA 50319

(515) 261-1111

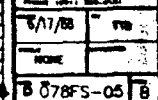
6/12/77

W. R. SPACE

5078FS-04 C

[illegible]

Nitroprusside Derivatives Project





APPROVED
W. R. GRACE - CONN
BY Reddy DATE 4/10

CEDAR CHEMICAL
 WEST, JULENA
 ASPHALT
 MAP PROCESS FLOWSHEET
 500 000 10-MINUTE PRODUCTION UNIT
 BITHIOPROCTIN DERIVATIVES PRODUCT



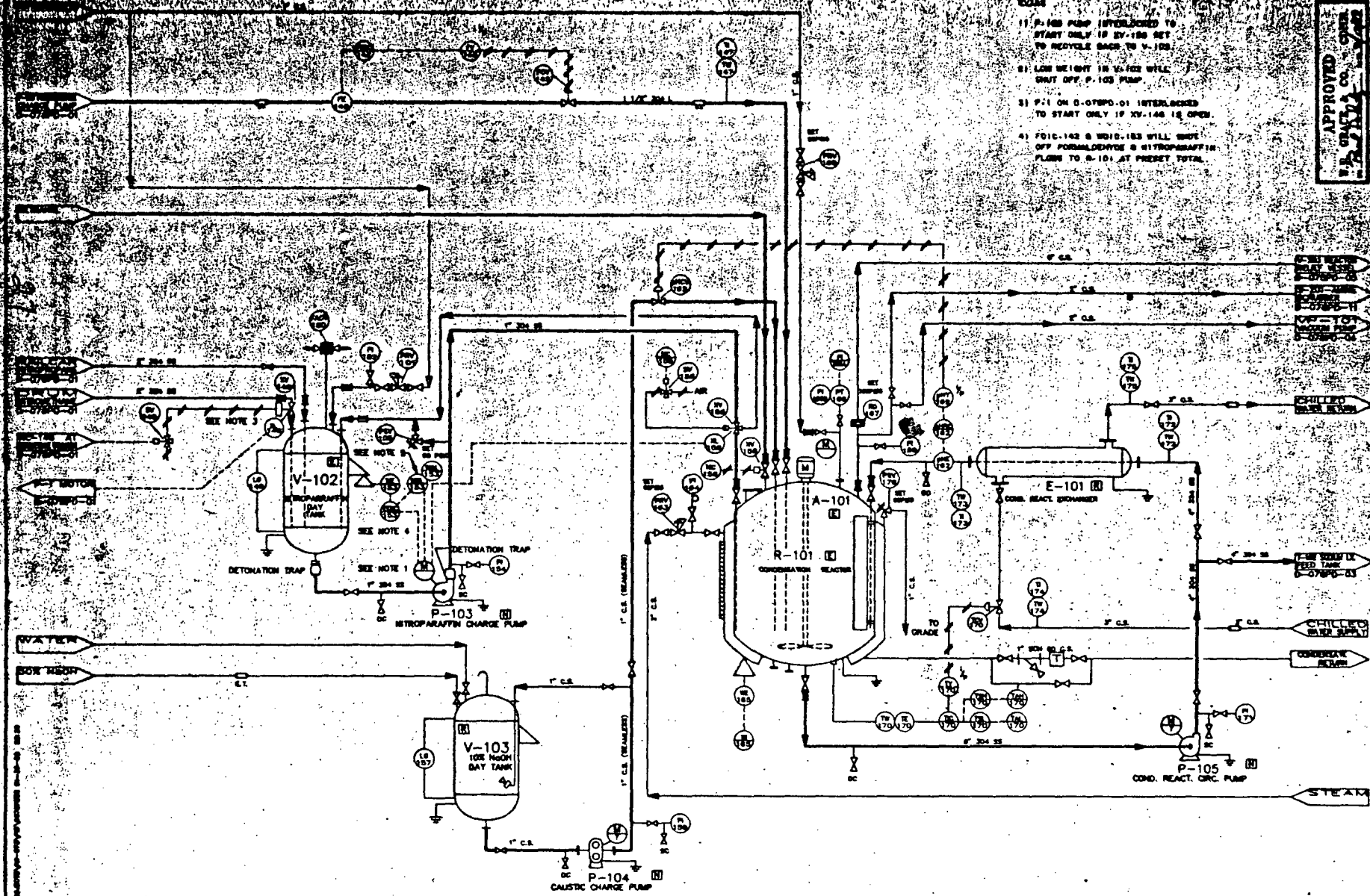
<p>CEDAR CHEMICAL</p> <p>AMP Process Fluorescent and 12/10/11 Fluorescent Ink</p> <p>Microperaffin Derivatives</p>	<p>12/10/11 Fluorescent Ink</p> <p>12/10/11 Fluorescent Ink</p> <p>12/10/11 Fluorescent Ink</p>
--	---

[illegible]

**DELTA
PROCESS
MANAGEMENT
INC.**

1000 MANAGEMENT BLVD.
SOUTH BEND, INDIANA 46708-2500
PHONE: (764) 333-5101

DATE / MO / YR	TID
PRICE INDEX	CUSTOMER
NO. 078FS-07	C



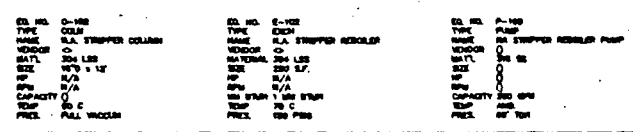
- NOTES
1. P-103 PUMP INTERLOCKED TO START ONLY IF XV-102 SET TO RECYCLE BACK TO V-102.
 2. LOW WEIGHT IN V-102 WILL SHUT OFF P-103 PUMP.
 3. P-101 ON D-0750-01 INTERLOCKED TO START ONLY IF XV-105 IS OPEN.
 4. F01C-102 & W01D-103 WILL SHUT OFF FORMALDEHYDE & NITROPARAFFIN FLOWS TO R-101 AT PRESET TOTAL.

APPROVED
W. J. STANLEY CO. OPER.
12/1/68

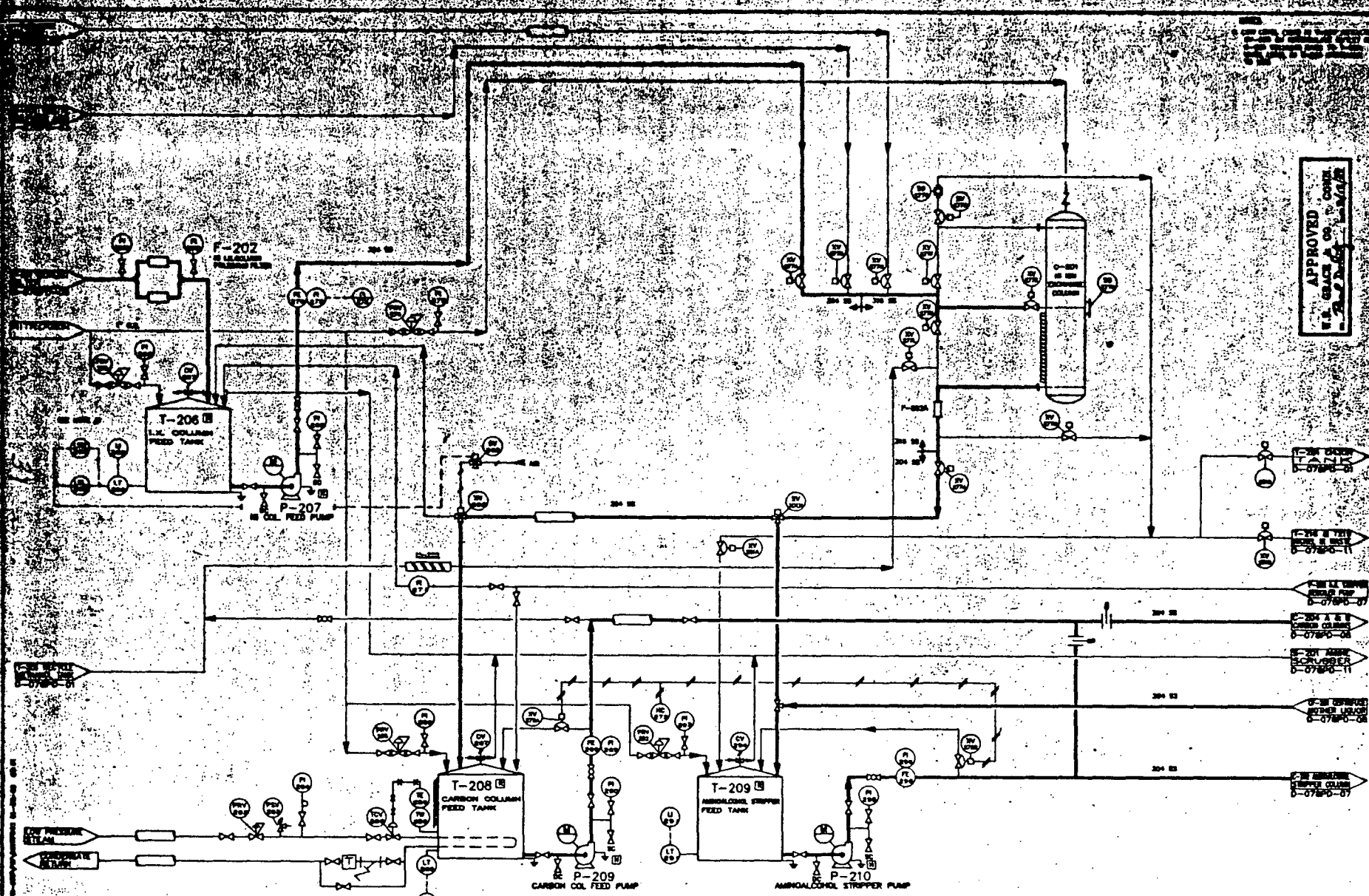
REVISIONS

NO.	DATE	DESCRIPTION
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Cedar Chemical Co.	
ANALYST	
W. J. STANLEY	
12/1/68	
DELTA PROCESS MANAGEMENT INC.	
4/18/68	
NONE	
D-0750-02	
1	
C	

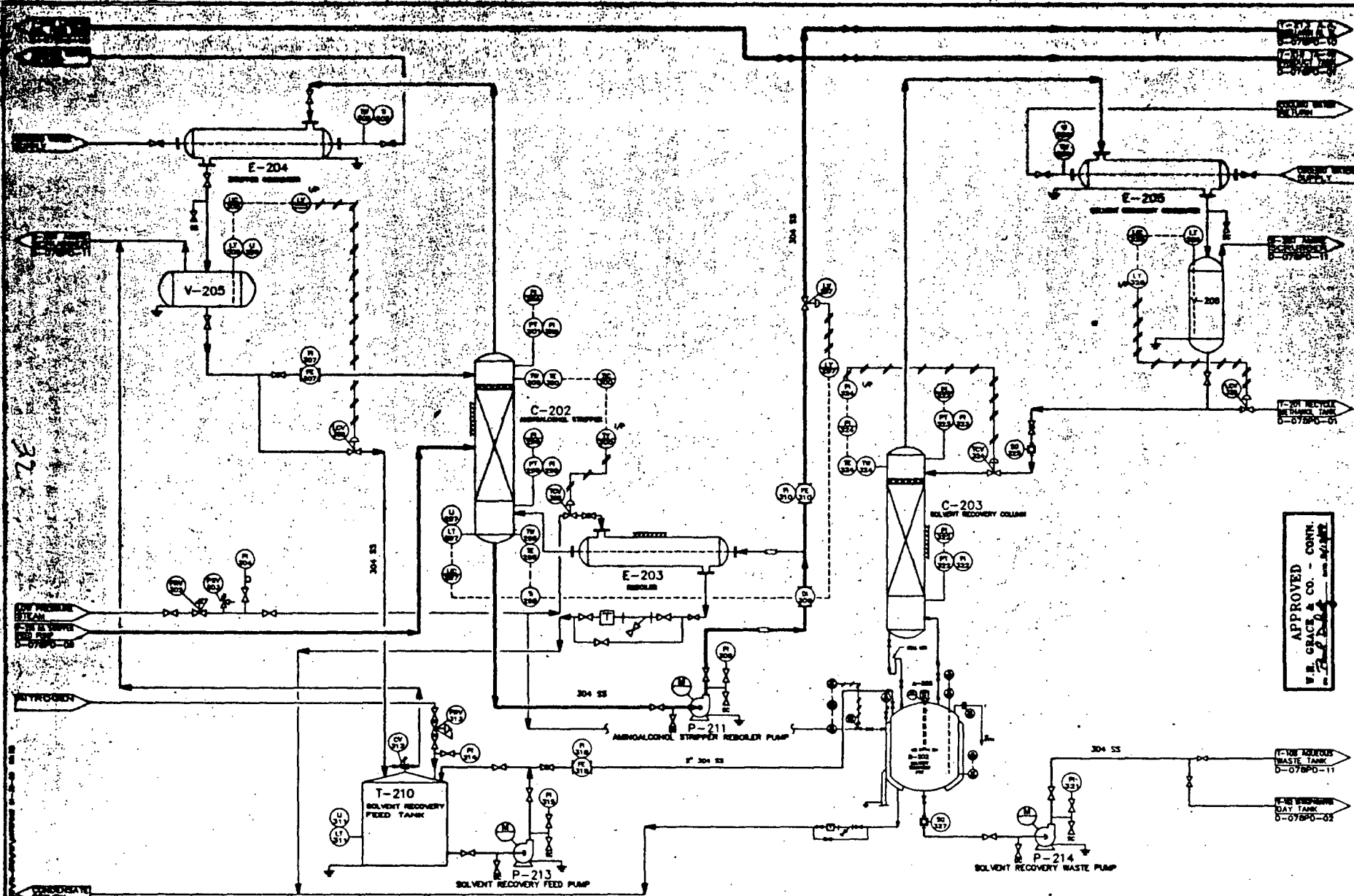


 <p>DELTA PROCESS MANAGEMENT INC.</p> <p>10000 Highway 100, Suite 100 Houston, Texas 77055 Phone (713) 661-1100</p>		<p>Cedar Chemical Co. 2000 Indiana Advocate</p> <p>Nitroalcohol Stripping RAW MATERIALS STORAGE & HANDLING</p> <p>Process and Instrument Diagram</p>		<p>The information appearing on this drawing is the property of Delta Process Management, Inc. and is loaned to you for your use only. It is not to be reproduced, copied, or used in any way without the written consent of Delta Process Management, Inc.</p>			
<p>DATE: 4/18/88</p> <p>BY: CWF</p> <p>REVISION: NONE</p>		<p>PROJECT: D-078P-04</p> <p>SCALE: 1" = 10'</p>		<p>10</p>			



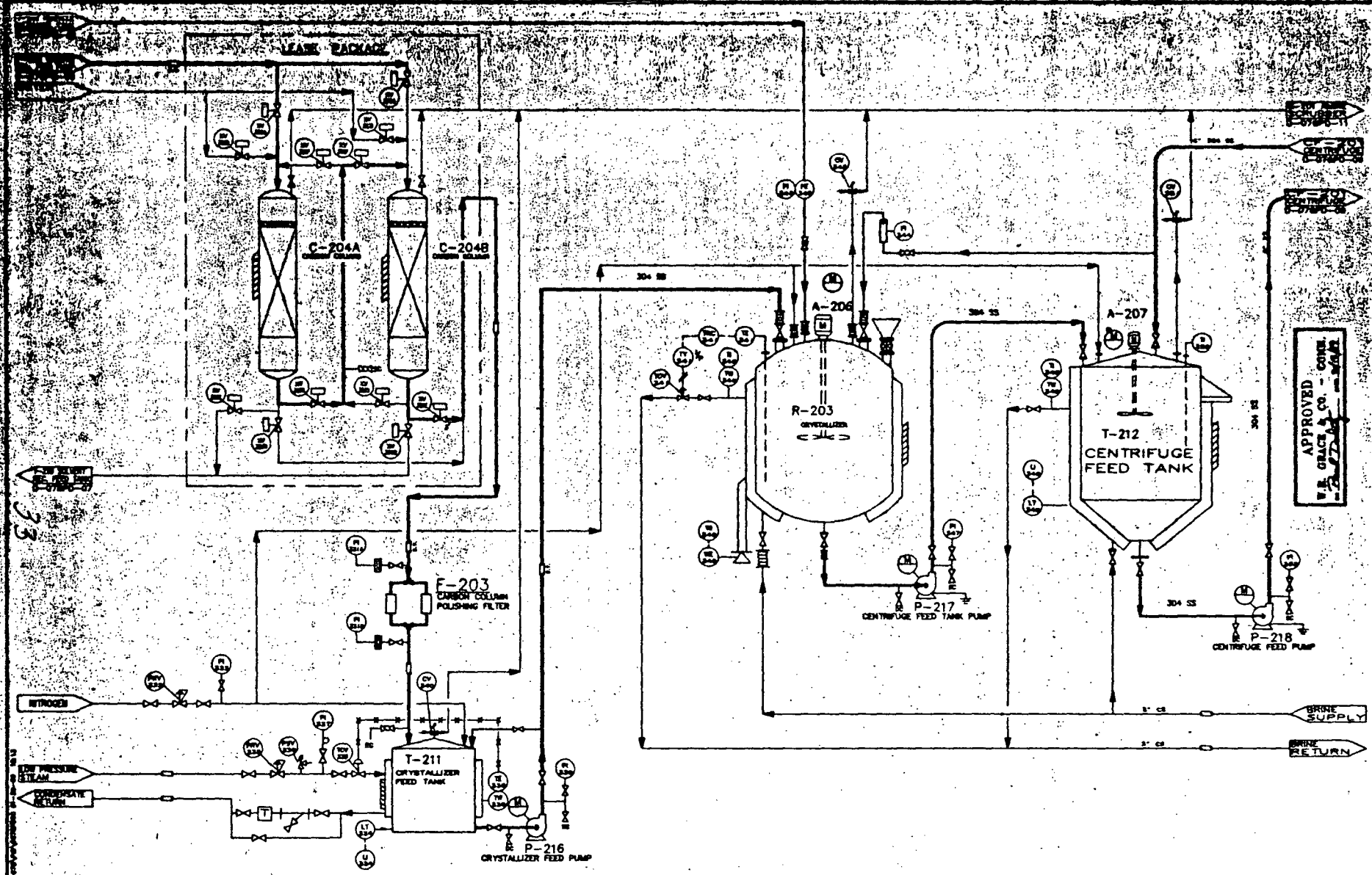
APPROVED
S.E. GRACE CO.
12/1/78

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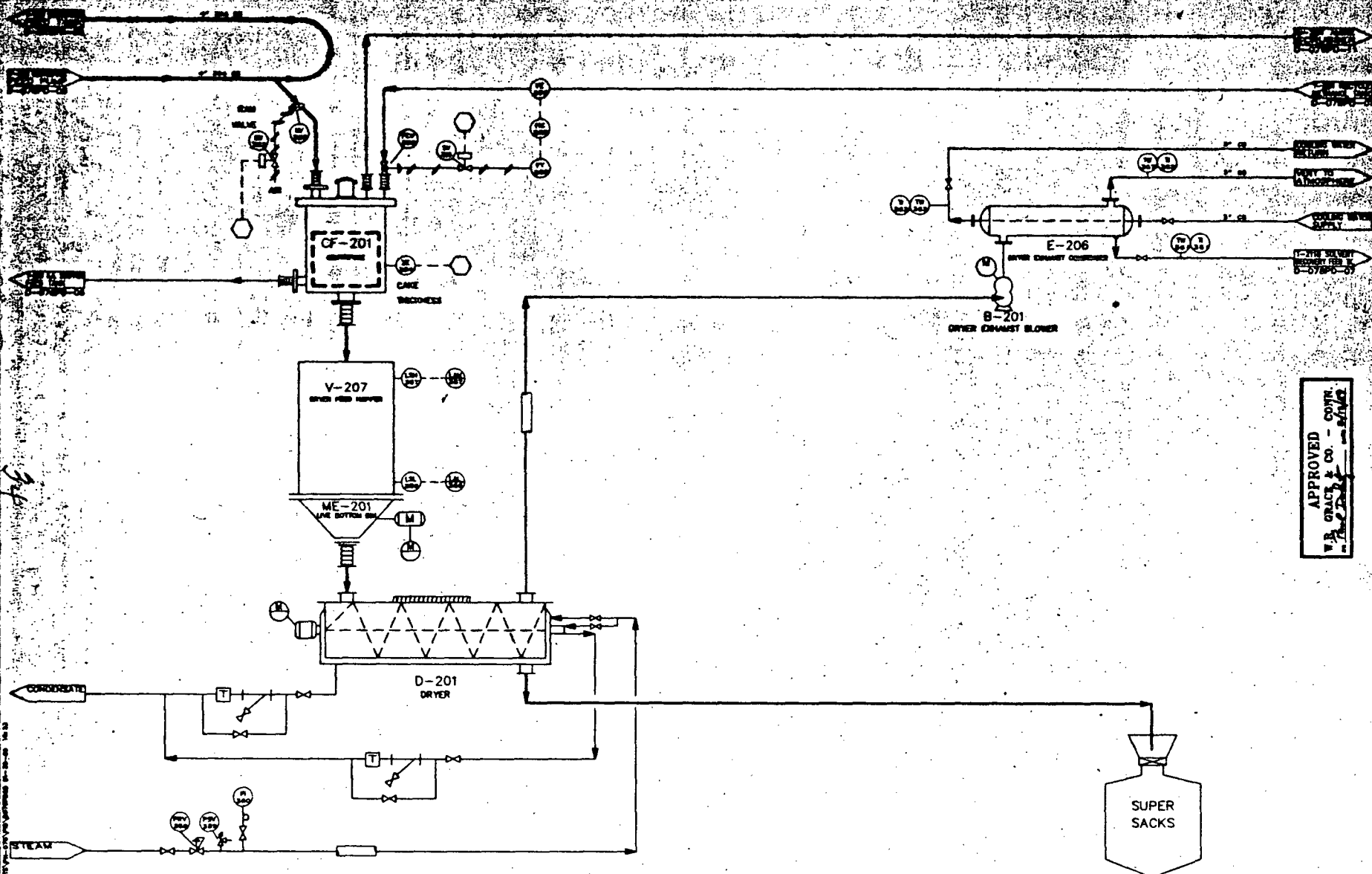
APPROVED
W.B. GRACE & CO. - CORN.
10-10-60

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<p>Cedar Chemical Co. Address Nitrophenol Derivatives Project Methanol Stripper and Solvent Recovery</p>	<p>Process and Instrument Diagram</p>
<p>DELTA PROCESS MANAGEMENT INC.</p>	<p>1/20/60 ONE</p>
<p>NONE</p>	<p>0-07890-07</p>



APPROVED
V.B. GRACE & CO. - CORP.
- 10/1/62

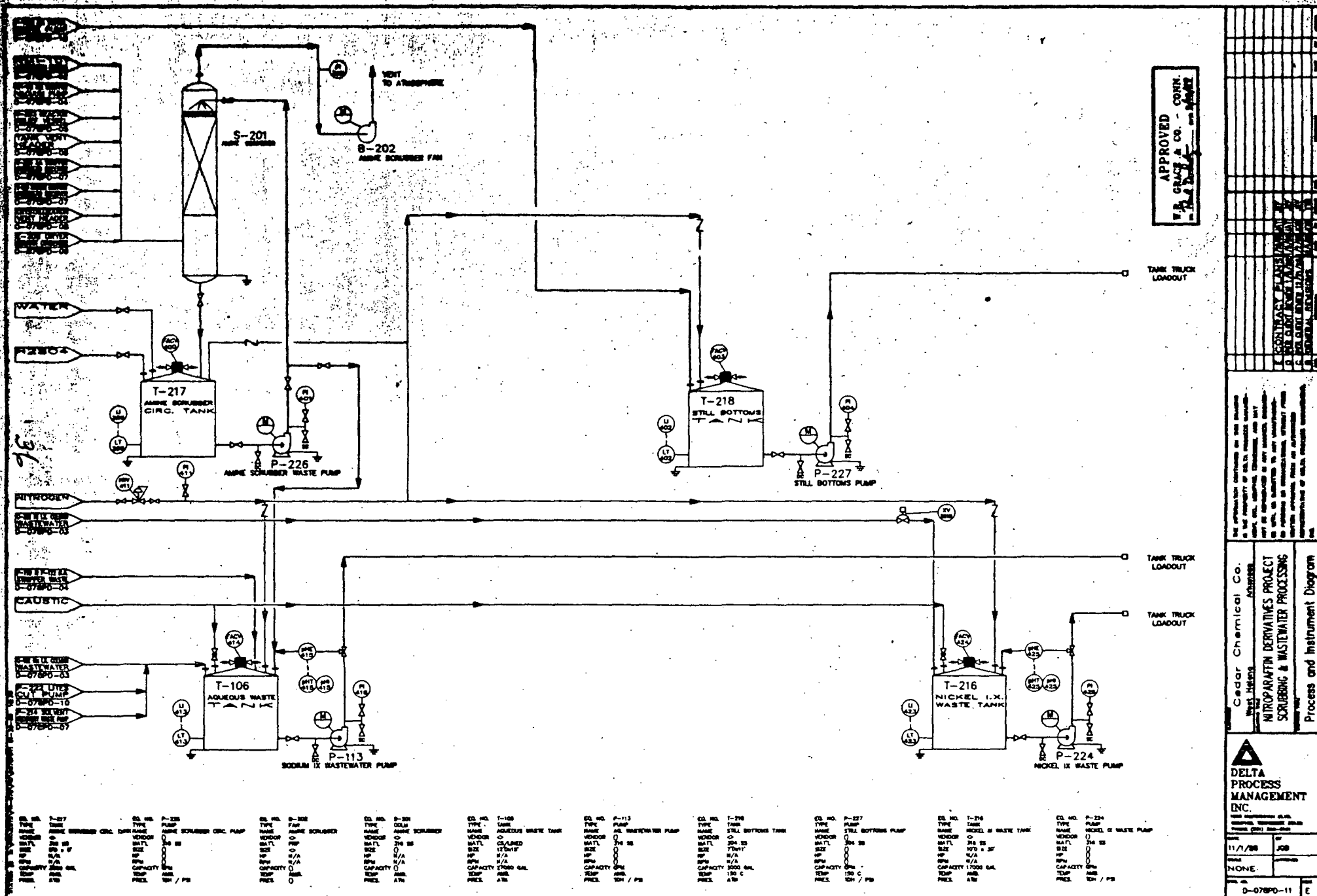
<div><div>DELTA PROCESS MANAGEMENT INC.</div><div><small>10000 International Road Houston, Texas 77036 Telephone (713) 261-1111</small></div></div>		Cedar Chemical Co. P.O. Box 1000 Hickory, North Carolina 28601		The information contained on this drawing is the property of Delta Process Management Inc. and is loaned to you for your use only. It is not to be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of Delta Process Management Inc.		NITROARAFIN DERIVATIVES PROJECT CARBON TREATMENT AND CRYSTALLIZATION		Process and Instrument Diagram	
4/20/86		GWS		INCHES		1/2"			
D-076-PO-08		1		2		3			



APPROVED
W.R. GRACE & CO. - CORP.
[Signature]

ES. NO.	CF-201	ES. NO.	V-207	ES. NO.	ME-201	ES. NO.	D-201	ES. NO.	B-201	ES. NO.	E-206
TYPE	DRYER FEED HOPPER	TYPE	DRYER	TYPE	DRYER EXHAUST BLOWER	TYPE	DRYER EXHAUST CONDENSER	TYPE	DRYER EXHAUST BLOWER	TYPE	DRYER EXHAUST CONDENSER
NAME		NAME		NAME		NAME		NAME		NAME	
SIZE	30" x 30"	SIZE	30" x 30"	SIZE	30" x 30"	SIZE	30" x 30"	SIZE	30" x 30"	SIZE	30" x 30"
MAT'L	SS	MAT'L	SS	MAT'L	SS	MAT'L	SS	MAT'L	SS	MAT'L	SS
WEIGHT	100 LB.	WEIGHT	100 LB.	WEIGHT	100 LB.	WEIGHT	100 LB.	WEIGHT	100 LB.	WEIGHT	100 LB.
CAPACITY	100 LB.	CAPACITY	100 LB.	CAPACITY	100 LB.	CAPACITY	100 LB.	CAPACITY	100 LB.	CAPACITY	100 LB.

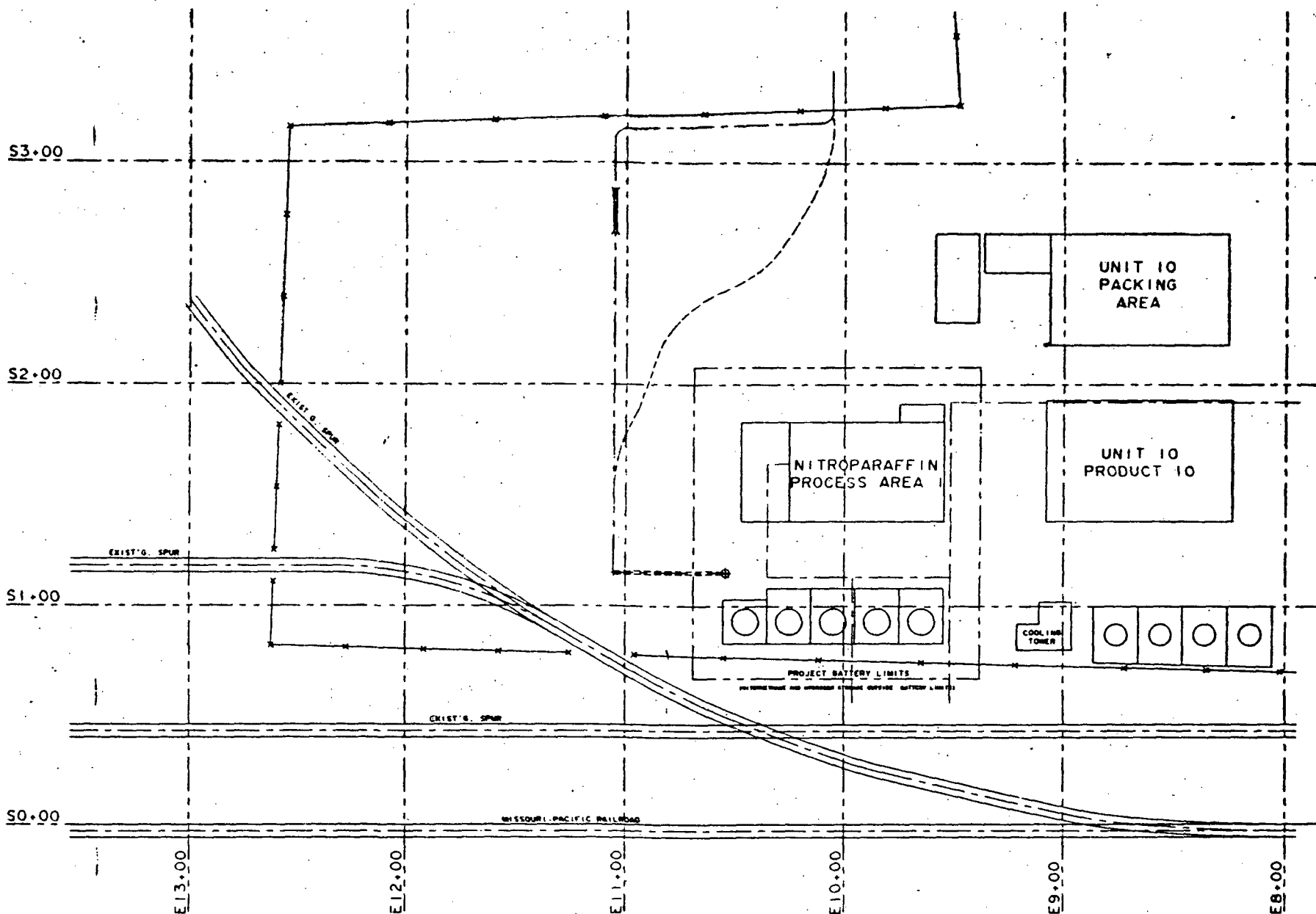
<p>DELTA PROCESS MANAGEMENT INC. 1000 West 10th Street Seattle, WA 98101 Phone: (206) 461-1234</p>		<p>Cedar Chemical Co. Attention: [Name] Nitroaromatic Derivatives Projects Centrifugal Drying and Packaging Project No. [Number]</p>	<p>Process and Instrument Diagram</p>
<p>4-20-88</p>	<p>10</p>		
<p>None</p>			
<p>D-078PO-08</p>			



Cedar Chemical Co.
11/7/88
NITROPARAFFIN DERIVATIVES PROJECT
SCRUBBER & WASTEWATER PROCESSING
Process and Instrument Diagram

DELTA PROCESS MANAGEMENT INC.
11/7/88
NONE
D-07890-11

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SITE PLAN

SCALE: 1" = 20' 0"

APPROVED
W. L. GRAFF, CHIEF ENGINEER
DATE: 11/29/80

<p>DELTA PROCESS MANAGEMENT INC.</p> <p>11/29/80</p> <p>1" = 20' 0"</p> <p>0-078C-81</p>	<p>CEAR CHEMICAL CO.</p> <p>WALL KLENA</p> <p>SITE PLAN</p> <p>NITROPARAFFIN DERIVATIVES PROJECT</p> <p>CIVIL DRAWING</p>	<p>NO. 1</p> <p>NO. 2</p> <p>NO. 3</p> <p>NO. 4</p> <p>NO. 5</p> <p>NO. 6</p> <p>NO. 7</p> <p>NO. 8</p> <p>NO. 9</p> <p>NO. 10</p> <p>NO. 11</p> <p>NO. 12</p> <p>NO. 13</p> <p>NO. 14</p> <p>NO. 15</p> <p>NO. 16</p> <p>NO. 17</p> <p>NO. 18</p> <p>NO. 19</p> <p>NO. 20</p> <p>NO. 21</p> <p>NO. 22</p> <p>NO. 23</p> <p>NO. 24</p> <p>NO. 25</p> <p>NO. 26</p> <p>NO. 27</p> <p>NO. 28</p> <p>NO. 29</p> <p>NO. 30</p> <p>NO. 31</p> <p>NO. 32</p> <p>NO. 33</p> <p>NO. 34</p> <p>NO. 35</p> <p>NO. 36</p> <p>NO. 37</p> <p>NO. 38</p> <p>NO. 39</p> <p>NO. 40</p> <p>NO. 41</p> <p>NO. 42</p> <p>NO. 43</p> <p>NO. 44</p> <p>NO. 45</p> <p>NO. 46</p> <p>NO. 47</p> <p>NO. 48</p> <p>NO. 49</p> <p>NO. 50</p> <p>NO. 51</p> <p>NO. 52</p> <p>NO. 53</p> <p>NO. 54</p> <p>NO. 55</p> <p>NO. 56</p> <p>NO. 57</p> <p>NO. 58</p> <p>NO. 59</p> <p>NO. 60</p> <p>NO. 61</p> <p>NO. 62</p> <p>NO. 63</p> <p>NO. 64</p> <p>NO. 65</p> <p>NO. 66</p> <p>NO. 67</p> <p>NO. 68</p> <p>NO. 69</p> <p>NO. 70</p> <p>NO. 71</p> <p>NO. 72</p> <p>NO. 73</p> <p>NO. 74</p> <p>NO. 75</p> <p>NO. 76</p> <p>NO. 77</p> <p>NO. 78</p> <p>NO. 79</p> <p>NO. 80</p> <p>NO. 81</p> <p>NO. 82</p> <p>NO. 83</p> <p>NO. 84</p> <p>NO. 85</p> <p>NO. 86</p> <p>NO. 87</p> <p>NO. 88</p> <p>NO. 89</p> <p>NO. 90</p> <p>NO. 91</p> <p>NO. 92</p> <p>NO. 93</p> <p>NO. 94</p> <p>NO. 95</p> <p>NO. 96</p> <p>NO. 97</p> <p>NO. 98</p> <p>NO. 99</p> <p>NO. 100</p>	<p>NO. 1</p> <p>NO. 2</p> <p>NO. 3</p> <p>NO. 4</p> <p>NO. 5</p> <p>NO. 6</p> <p>NO. 7</p> <p>NO. 8</p> <p>NO. 9</p> <p>NO. 10</p> <p>NO. 11</p> <p>NO. 12</p> <p>NO. 13</p> <p>NO. 14</p> <p>NO. 15</p> <p>NO. 16</p> <p>NO. 17</p> <p>NO. 18</p> <p>NO. 19</p> <p>NO. 20</p> <p>NO. 21</p> <p>NO. 22</p> <p>NO. 23</p> <p>NO. 24</p> <p>NO. 25</p> <p>NO. 26</p> <p>NO. 27</p> <p>NO. 28</p> <p>NO. 29</p> <p>NO. 30</p> <p>NO. 31</p> <p>NO. 32</p> <p>NO. 33</p> <p>NO. 34</p> <p>NO. 35</p> <p>NO. 36</p> <p>NO. 37</p> <p>NO. 38</p> <p>NO. 39</p> <p>NO. 40</p> <p>NO. 41</p> <p>NO. 42</p> <p>NO. 43</p> <p>NO. 44</p> <p>NO. 45</p> <p>NO. 46</p> <p>NO. 47</p> <p>NO. 48</p> <p>NO. 49</p> <p>NO. 50</p> <p>NO. 51</p> <p>NO. 52</p> <p>NO. 53</p> <p>NO. 54</p> <p>NO. 55</p> <p>NO. 56</p> <p>NO. 57</p> <p>NO. 58</p> <p>NO. 59</p> <p>NO. 60</p> <p>NO. 61</p> <p>NO. 62</p> <p>NO. 63</p> <p>NO. 64</p> <p>NO. 65</p> <p>NO. 66</p> <p>NO. 67</p> <p>NO. 68</p> <p>NO. 69</p> <p>NO. 70</p> <p>NO. 71</p> <p>NO. 72</p> <p>NO. 73</p> <p>NO. 74</p> <p>NO. 75</p> <p>NO. 76</p> <p>NO. 77</p> <p>NO. 78</p> <p>NO. 79</p> <p>NO. 80</p> <p>NO. 81</p> <p>NO. 82</p> <p>NO. 83</p> <p>NO. 84</p> <p>NO. 85</p> <p>NO. 86</p> <p>NO. 87</p> <p>NO. 88</p> <p>NO. 89</p> <p>NO. 90</p> <p>NO. 91</p> <p>NO. 92</p> <p>NO. 93</p> <p>NO. 94</p> <p>NO. 95</p> <p>NO. 96</p> <p>NO. 97</p> <p>NO. 98</p> <p>NO. 99</p> <p>NO. 100</p>
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1985 Nonconnah Blvd. • Memphis, TN 38132 (901) 398-5151 or 398-5152

EXHIBIT D

- D.1 Equipment to be purchased and furnished by Delta Process Management, Inc.
- D.2 Equipment supplied from West Helena, Arkansas Plant
- D.3 Equipment supplied from Vicksburg, Mississippi Plant

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EXHIBIT D.1

CEDAR CHEMICAL NITROPARAFFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL OF CONST	CAPACITY	SIZE	TEMP	PRESSURE	ORIGIN	REMARKS	COST EST. VALUE
** PROCESS & INSTRUMENTATION DIAGRAM No. 01										
A-202	CATALYST RINSE TANK <> AGITATOR		C.S.	GPM	<>	AMB	ATM	N		0
F-200	CATALYST RINSE POLISHING FILTER		316 SS			AMB		N		0
P-100	FORMALDEHYDE DAY TANK CHARGE PUMP	()	316 SS	100GPM	3x1.5 - 8	AMB.	60' TDH	N		0
P-202	RECYCLE METHANOL PUMP	()	D.I.	GPM	()	AMB.		N		0
P-203	CATALYST RINSE TANK PUMP	()	D.I.	GPM	()	AMB.		N		0
** Subtotal **										0
** PROCESS & INSTRUMENTATION DIAGRAM No. 02										
P-102	FORMALDEHYDE CHARGE PUMP	()	316 SS	20 GPM	()	AMB.	70 PSI	N		0
P-103	NITROPARAFFIN CHARGE PUMP	()	316 SS	5 GPM	()	AMB.	160' TDH	N	VARIABLE FREQUENCY DRIVE	0
P-104	CAUSTIC CHARGE PUMP	()	C.I.	5 GPM	()	AMB.	70 PSIG	N		0
P-105	CONDENSATION REACTOR CIRC. PUMP	()	316 SS	300 GPM	()	AMB.	60' TDH	N		0
** Subtotal **										0
** PROCESS & INSTRUMENTATION DIAGRAM No. 03										
C-101	SODIUM ION EXCHANGE COLUMN	IWT	316 SS	25 CU.FT.	30"D x 8'	AMB.		N		0

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CEDAR CHEMICAL NITROPARAFFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL OF CONST	CAPACITY	SIZE	TEMP	PRESSURE	ORIGIN	REMARKS	COST EST. VALUE
F-101	SODIUM IX POLISH FILTER		316 SS			AMB		N	CARTRIDGE TYPE	0
F-102	SODIUM IX STRAINER	IWT	316 SS			AMB		N	SUPPLIED w/ C-101	0
P-106	SODIUM IX COLUMN FEED PUMP	()	316 SS	25 GPM	()	AMB.	60' TDH	N		0
P-107	DILUTE NITROALCOHOL PUMP	()	316 SS	5 GPM	()	AMB.	50' TDH	N		0
P-108	NA STRIPPER FEED PUMP	()	316 SS	10 GPM	()	AMB.	50' TDH	N		0
T-105	NA STRIPPER FEED TANK	<>	304 SS	4000 GAL	8'D x 11'	AMB	ATM	N		0
T-108	DI WATER TANK		FRF	6000 GAL	9'D x 13'	AMB	ATM	N		0
** Subtotal **										0
** PROCESS & INSTRUMENTATION DIAGRAM No. 04										
C-102	NA STRIPPER COLUMN	<>	316 SS	()	24"D x 12'	90 C	FULL VACUUM	N		0
E-102	NA STRIPPER REBOILER	<>	316 SS	1 MM BTUH	100 S.F.	70 C	150 PSIG	N		0
E-104	NA STRIPPER CONDENSER	<>	316 SS		200 S.F.	()	75 PSIG	N		0
E-105	SECONDARY NA STRIPPER CONDENSER	<>	316 SS		20 S.F.	()	75 PSIG	N		0
P-109	NA STRIPPER REBOILER PUMP	()	316 SS	200 GPM	()	AMB.	60' TDH	N		0
P-110	NA STRIPPER REFLUX PUMP	()	316 SS	GPM	()	AMB.	TDH	N		0

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CEDAR CHEMICAL NITROPARAFFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL OF CONST	CAPACITY	SIZE	TEMP	PRESSURE	ORIGIN	REMARKS	COST EST. VALUE
P-204	NA FEED PUMP	()	316 SS	10 GPM	()	AMB.	1500 PSI	N		0
T-204	NA FEED TANK	<>	316 SS	2000 GAL	4' D x 23'	AMB	ATM	N		0
VP-101	NA STRIPPER VACUUM PUMP	()	C.S.		()	AMB	28.5" Hg	N	VAC.	0
** Subtotal **										0
** PROCESS & INSTRUMENTATION DIAGRAM No. 05										
A-201	REACTOR AGITATOR	LIGHTNIN	316 SS	N/A	<>	40 C	1500 PSIG	N		0
A-203	CATALYST CHARGE VESSEL AGITATOR	<>	316 SS		()	AMB		N		0
E-201	REACTOR VENT CONDENSER	<>	316 SS		<>		150 PSIG	N		0
P-205	CATALYST SLURRY PUMP	()	C.I.	GPM	()	40 C	TDH	N		0
P-206	CATALYST FILTER FEED PUMP	()	316 SS	GPM	()	40 C	TDH	N		0
R-201	HYDROGENATION REACTOR	BLAW-KNOX	316 SS	1500 GAL	5' D x 10'	50 C	1500 PSIG	N	\$120,000 Credit to Cedar on 1st Invoice	0
** Subtotal **										0
** PROCESS & INSTRUMENTATION DIAGRAM No. 06										
C-201A	NICKEL ION EXCHANGE COLUMN	IWT	316 SS	25 CU.FT.	2' D x 11'6"	40 C		N		0
E-202	WASH WATER HEATER	<>	C.S.		<>	200 C	150 PSIG	N		0
F-202	Ni ION EXCHANGE POLISHING FILTER	<>	316 SS	()	<>	40 C	()	N		0

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CEDAR CHEMICAL NITROPARAFFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL OF CONST	CAPACITY	SIZE	TEMP	PRESSURE	ORIGIN	REMARKS	COST EST. VALUE
F-203A	NI IX STRAINER	IWT	316 SS			AMB		N	SUPPLIED w/ C-201A	0
P-207	NI COLUMN FEED PUMP	()	316 SS	10 GPM	()	40 C		N		0
P-208	RESIN EXPANSION FEED PUMP	()	316 SS	50 GPM	()	AMB		N		0
P-209	CARBON COLUMN FEED PUMP	()	316 SS	10 GPM	()	60 C		N		0
P-210	AA STRIPPER FEED PUMP	()	316 SS	10 GPM	()	AMB	60' TDH	N		0
** Subtotal **										0
** PROCESS & INSTRUMENTATION DIAGRAM No. 07										
C-202	AA STRIPPER COLUMN	()	316 SS		18" D x 14'	110 C	ATM	N		0
E-203	AA STRIPPER REBOILER	()	316 SS		()	200 C	150 PSIG	N		0
E-204	AA STRIPPER CONDENSER	()	316 SS		200 S.F.	85 C	75 PSIG	N		0
E-205	SOLVENT RECOVERY CONDENSER	()	316 SS		130 S.F.	65 C	75 PSIG	N		0
P-211	AA STRIPPER REBOILER PUMP	()	316 SS	25 GPM	()	110 C	60' TDH	N		0
P-212	AA STRIPPER REFLUX PUMP	()	316 SS	10 GPM	()	85 C	50' TDH	N		0
P-213	SOLVENT RECOVERY FEED PUMP	()	316 SS	100 GPM	()	85 C	50' TDH	N		0
P-214	SOLVENT RECOVERY WASTE PUMP	()	316 SS	100 GPM	()	100 C	50' TDH	N		0

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CEDAR CHEMICAL NITROPHRIFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL OF CONST	CAPACITY	SIZE	TEMP	PRESSURE	ORIGIN	REMARKS	COST EST. VALUE
T-210	SOLVENT RECOVERY FEED TANK	<>	304 SS	6000 GAL	9'D x 17'	85 C	ATM	N		0
** Subtotal **										0
** PROCESS & INSTRUMENTATION DIAGRAM No. 08										
C-204A	CARBON COLUMN	<>	CS/LINED ()		3'D x 8'	60 C	150 PSIG	N	LEASE	0
C-204B	CARBON COLUMN	<>	CS/LINED ()		3'D x 8'	60 C	150 PSIG	N	LEASE	0
F-204	CARBON COLUMN POLISHING FILTER	<>	316 SS ()		<>	60 C	()	N		0
P-216	CRYSTALLIZER FEED PUMP	()	316 SS	200 GPM	()	60 C	50' TDH	N		0
P-217	CENTRIFUGE FEED TANK PUMP	()	316 SS	200 GPM	()	10 C	50' TDH	N	RECESSED IMPELLER	0
F-218	CENTRIFUGE FEED PUMP	()	316 SS	150 GPM	()	10 C	50' TDH	N	RECESSED IMPELLER	0
T-211	CRYSTALLIZER FEED TANK	<>	316 SS	8000 GAL	9'D x 17'	60 C	ATM	N		0
** Subtotal **										0
** PROCESS & INSTRUMENTATION DIAGRAM No. 09										
B-201	DRYER EXHAUST BLOWER	()	CS	125 CFM	()	65 C	"H2O	N		0
CF-201	CENTRIFUGE	<>	316 SS ()		48" x 30"	10 C	ATM	N		0
D-201	DRYER	<>	316 SS	1.3 MM BTU	150 S.F.	()	()	N		0
E-206	DRYER EXHAUST CONDENSER	<>	316 SS		100 S.F.	()	()	N		0

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CEDAR CHEMICAL NITROPARAFFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL OF CONST	CAPACITY	SIZE	TEMP	PRESSURE	ORIGIN	REMARKS	COST EST. VALUE
V-210	DRY PRODUCT BIN		C.S.	10 CU.FT.		50 C	ATM	N		0
** Subtotal **										0
** PROCESS & INSTRUMENTATION DIAGRAM No. 10										
C-205	AA DISTILLATION COLUMN	<>	316 SS		2'D x 39'	150 C	FULL VACUUM	N	W/ STRUCTURED PACKING	0
E-207	AA PRODUCT OVERHEAD CONDENSER		316 SS		()	130 C	75 PSIG	N		0
P-219	AA DISTILLATION FEED () PUMP		316 SS	GPM	()	110 C	TDH	N		0
P-220	AA DISTILLATION WASTE PUMP	()	316 SS	GPM	()	150 C	TDH	N		0
P-221	AA DISTILLATION REFLUX PUMP	()	316 SS	GPM	()	130 C	TDH	N		0
P-222	AA LITES CUT PUMP	()	316 SS	GPM	()	120 C	TDH	N		0
P-223	AA PRODUCT PUMP	()	316 SS	GPM	()	130 C	TDH	N		0
T-213	AA DISTILLATION FEED () TANK	<>	304 SS	10100 GAL	11'6"D x 13'	110 C	ATM	N		0
V-208	AA PRODUCT OVERHEAD RECEIVER	<>	316 SS	50 - 100 G <>		130 C	FULL VACUUM	N		0
** Subtotal **										0
** PROCESS & INSTRUMENTATION DIAGRAM No. 11										
B-202	AMINE SCRUBBER FAN		FRP			AMB	"H2O	N		0
P-113	AQUEOUS WASTEWATER PUMP	()	D.I.	GPM	()	AMB	TDH	N		0

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CEDAR CHEMICAL NITROPARAFFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL OF CONST	CAPACITY	SIZE	TEMP	PRESSURE	ORIGIN	REMARKS	COST EST. VALUE
P-224	NICKEL IX WASTE PUMP ()		316 SS	GPM	()	AMB.	TDH	N		0
P-226	AMINE SCRUBBER PUMP ()		316 SS	GPM	()	AMB	TDH	N		0
P-227	STILL BOTTOMS PUMP ()		D.I.	GPM	()	150 C	TDH	N		0
T-106	AQUEOUS WASTE TANK < >		316SS	23600 GAL	12'D x 28'	AMB	ATM	N		0
T-218	STILL BOTTOMS TANK < >		CS	11500 GAL	11'D x 15'	150 C	ATM	N		0
** Subtotal **										0
*** Total ***										0

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EXHIBIT D.2

CEDAR CHEMICAL NITROFARIFFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL OF CONST	CAPACITY	SIZE	MOTOR HP	RPM	TEMP	PRESSURE	ORIGIN	REMARKS
** PROCESS & INSTRUMENTATION DIAGRAM No. 01											
T-202	RECYCLE METHANOL TANK	()	C.S.	30000 GAL	12'D x 36'	0.00	N/A	AMB.	ATM	E	T-M108 @ W. HELENA
** PROCESS & INSTRUMENTATION DIAGRAM No. 02											
A-101	CONDENSATION REACTOR AGITATOR	CHEMINEER	304 SS		<>	25.00	()	35 C	50 PSIG	E	CHECK MIXING
E-101	CONDENSATION REACTOR EXCHANGER	BEAUMONT	316 SS	1.1 MM BTU	300 S.F.	0.00	N/A	100 C	100 PSIG	E	FABRICATE NEW HEADS. 14"D x 16", 76 TUBE
R-101	CONDENSATION REACTOR	BLAW-KNOX	347 SS	3500 GAL	8'6"D x 9'	0.00	N/A	AMB.	150 PSIG INT./FV	E	R-M101 @ W. HELENA
V-102	NITROFARAFFIN DAY TANK	<>	316 SS	2200 GAL	7'D x 8'	0.00	N/A	AMB.	ATM	E	V-M101 @ W. HELENA
V-103	10% NaOH DAY TANK	<>	C.S.	100 GAL	2'D x 3'	0.00	N/A	AMB.	()	E	@ W. HELENA
** PROCESS & INSTRUMENTATION DIAGRAM No. 05											
V-202	REACTOR K.O. POT	<>	C.S.	()	()	0.00	N/A	40 C	150 PSIG	E	W/ DEMISTER
V-203	REACTOR RELIEF VESSEL	TAYL/FORGE	316 SS	2200 GAL	5'D x 15'	0.00	N/A	40 C	1100 PSIG	E	EXIST. HORIZ. AUTOCLAVE @ W. HELENA
V-204	CATALYST TANK K.O. POT	<>	C.S.	()	()	0.00	N/A	40 C	150 PSIG	E	W/ DEMISTER
** PROCESS & INSTRUMENTATION DIAGRAM No. 06											
T-206	N1 IX COLUMN FEED TANK	<>	316 SS	3000 GAL	8'D x 8'	0.00	N/A	40 C	ATM	E	T-N204 @ W. HELENA

CEDAR CHEMICAL NITROPARAFFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL CAPACITY OF CONST	SIZE	MOTOR RPM HP	TEMP	PRESSURE	ORIGIN	REMARKS
** PROCESS & INSTRUMENTATION DIAGRAM No. 10									
T-215	AA PRODUCT CUT TANK <>	316 SS	1700 GAL	6'D x 7'9"	0.00 N/A	130 C	ATM	E	T-FE205 @ W. HELENA HORIZ.
** PROCESS & INSTRUMENTATION DIAGRAM No. 11									
T-216	NICKEL IX WASTE TANK <>	CS/LINED	17600 GAL	10'D x 30'	0.00 N/A	AMB	ATM	E	V-M102 @ HELENA. ADD LINING

Page No. 1
03/06/89

EXHIBIT D.3

CEDAR CHEMICAL NITROPARAFFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL OF CONST	CAPACITY	SIZE	TEMP	PRESSURE	ORIGIN	REMARKS	COST EST. VALUE
** PROCESS & INSTRUMENTATION DIAGRAM No. 01										
T-203	CATALYST RINSE TANK	()	S.S.	250 GAL	43"D x 3'6"	AMB.	ATM	R	T-101 @ VICKSBURG	2000
** Subtotal **										2000
** PROCESS & INSTRUMENTATION DIAGRAM No. 03										
T-102	SODIUM IX COLUMN FEED TANK	<>	S.S.	4000 GAL	6'D x 20'	AMB	ATM	R	T-230 @ VICKSBURG	10000
T-104	DILUTE NITROALCOHOL TANK	<>	SS CLAD	2000 GAL	7'D x 7'	AMB	ATM	R	TANK XVII @ VICKSBURG	7500
** Subtotal **										17500
** PROCESS & INSTRUMENTATION DIAGRAM No. 04										
V-104	NA STRIPPER RECEIVER	<>	316 SS	225 GAL	3'6"D x 3'	AMB	FULL VACUUM	R	K.O. POT 3 @ VICKSBURG	1000
** Subtotal **										1000
** PROCESS & INSTRUMENTATION DIAGRAM No. 05										
A-202	CATALYST SETTLING TANK AGITATOR	LIGHTNIN	316 SS		74-0-30	40 C	75 PSIG	R	w/ V-3543 @ VICKSBURG	2000
F-201	CATALYST FILTER	<>	316 SS	()	280 SQ.FT.	40 C		R	ATRAZINE @ VICKSBURG	12500
T-205	CATALYST SETTLING TANK	<>	MONEL	2500 GAL	6'8"D x 9'3"	40 C	75 PSIG	R	V-3543 @ VICKSBURG	6000
V-201	CATALYST CHARGE VESSEL	<>	316 SS	600-1000 G	5'6"D x 6'6"	30 C	150 PSIG	R	T-3535 @ VICKSBURG	3000
V-209	REACTOR VENT RECEIVER		C.S.	100' GAL		AMB	ATM	R	V-3508 @ VICKSBURG	500

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CEDAR CHEMICAL NITROFARIFFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL OF CONST	CAPACITY	SIZE	TEMP	PRESSURE	ORIGIN	REMARKS	COST EST. VALUE
** Subtotal **										24000
** PROCESS & INSTRUMENTATION DIAGRAM No. 06										
T-208	CARBON COLUMN FEED TANK	<>	316 SS	4000 GAL	9'D x 9'	60 C	ATM	R	R-1 @ VICKSBURG w/ JACKET	9000
T-209	AA STRIPPER FEED TANK	<>	GLS	3000 GAL	8'D x 8'	AMB	ATM	R	V-2705 or V-2742 @ VICKSBURG	7500
** Subtotal **										16500
** PROCESS & INSTRUMENTATION DIAGRAM No. 07										
A-205	SOLVENT RECOVERY POT AGITATOR		316 SS		()	110 C	ATM	R	w/ V-2741 @ VICKSBURG	0
E-203	SOLVENT RECOVERY COLUMN	<>	304 SS		28"D x 22'	100 C	ATM	R	ACETONE COLUMN @ VICKSBURG	17500
R-202	SOLVENT RECOVERY POT	<>	GLS	4000 GAL		100 C	ATM	R	V-2741 @ VICKSBURG	0
V-205	AA STRIPPER OVERHEAD RECEIVER	<>	SS CLAD	250 GAL	43"D x 3'6"	85 C	ATM	R	T-103 @ VICKSBURG. ADD TOP	1000
V-206	SOLVENT RECOVERY OVERHEAD RECEIVER	<>	C.S.	325 GAL	3'8"D x 4'6"	65 C	ATM	R	V-3507 @ VICKSBURG	1000
** Subtotal **										19500
** PROCESS & INSTRUMENTATION DIAGRAM No. 08										
A-206	CRYSTALLIZER AGITATOR		GLS		()	60 C	ATM	R	w/ R-12 @ VICKSBURG	1000
A-207	CENTRIFUGE FEED TANK AGITATOR		GLS		()	10 C	ATM	R	w/ R-11 @ VICKSBURG	1000

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CEDAR CHEMICAL NITROPARAFFIN DERIVATIVES PROJECT
W. HELENA EQUIPMENT LIST
WEST HELENA, ARKANSAS
Job No. PN-078

ITEM #	EQUIPMENT DESCRIPTION	EQUIPMENT VENDOR	MATERIAL OF CONST	CAPACITY	SIZE	TEMP	PRESSURE	ORIGIN	REMARKS	COST EST. VALUE
R-203	CRYSTALLIZER	<>	GLS	3000 GAL	8'D x 8'	60 C	ATM	R	R-12 @ VICKSBURG	10000
T-212	CENTRIFUGE FEED TANK	<>	GLS	4000 GAL	8'D x 11'	10 C	ATM	R	R-11 @ VICKSBURG	12000
** Subtotal **										24000
** PROCESS & INSTRUMENTATION DIAGRAM No. 09										
ME-201	VIBRATING BIN BOTTOM	<>	316 SS	()	<>	AMB.	ATM	R	W/ V-207 @ VICKSBURG	0
V-207	DRYER FEED HOPPER	<>	316 SS	75 CU. FT	4'D x 4'	AMB.	ATM	R	@ VICKSBURG	4500
** Subtotal **										4500
** PROCESS & INSTRUMENTATION DIAGRAM No. 10										
R-204	AA DISTILLATION PDT	<>	MONEL	2500 GAL	6'8"D x 9'3"	150 C	FULL VACUUM	R	V-3544 @ VICKSBURG	6000
T-214	LITES CUT TK	<>	316 SS	750 GAL	4'D x 8'	120 C	ATM	R	K.O. PDT 2 @ VICKSBURG	500
** Subtotal **										6500
** PROCESS & INSTRUMENTATION DIAGRAM No. 11										
S-201	AMINE SCRUBBER		FRP		18"D x 17'	AMB	ATM	R	WALLACE MURRAY @ VICKSBURG	10000
T-217	AMINE SCRUBBER CIRC TANK	<>	FRP	1470 GAL	5'D x 10'	AMB	ATM	R	W/ S-201	6000
** Subtotal **										16000
*** Total ***										131500

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1985 Nonconnah Blvd. • Memphis, TN 38132 (901) 398-5151 or 398-5152

EXHIBIT E

INSPECTION CHECKLIST

The following form shall be used as a checklist and record document when selecting and inspecting used process equipment for projects under the direction of Delta Process Management personnel.

1. TANKS, REACTORS, VESSELS, HEAT EXCHANGERS, DRYERS, CENTRIFUGE
Original Manufacturer _____
Date of Manufacture _____
Material of Construction _____
Availability of Drawings and Maintenance Records _____
Pressure Vessel U-1 Report _____
2. VISUAL INSPECTION
Overall appearance _____
Corrosion indication _____ Extent _____
Welds _____
Repairs _____
Nozzle Damage _____ Extent _____ Location _____
Nozzle Weld Appearance _____ Level _____ Flange Style _____
3. INTERNAL AND EXTERNAL INSPECTION
Appearance _____
Cleanliness _____ Chemical Contamination _____
Corrosion (pitting, cracking, embrittlement) _____
Appearance of Welds _____

Page Two
INSPECTION CHECKLIST
EXHIBIT E

4. THICKNESS TEST

Type _____

Head _____ 0-90, _____ 90-180, _____ 180-270, _____ 270-360 Top

Head _____ 0-90, _____ 90-180, _____ 180-270, _____ 270-360 Btm

Shell _____ 0-90, _____ 90-180, _____ 180-270, _____ 270-360 Top

Shell _____ 0-90, _____ 90-180, _____ 180-270, _____ 270-360 Btm

Jacket _____ 0-90, _____ 90-180, _____ 180-270, _____ 270-360 Hd

Jacket _____ 0-90, _____ 90-180, _____ 180-270, _____ 270-360 Btm

5. PRESSURE VESSELS ASME

Pressure Rating _____ PSI @ _____ Degrees F, Natl Bd _____

Year Built _____, Natl Bd Stamps _____, _____, _____, _____

Hydrostatic Test Pressure (1.5 Times) _____ PSI

Vacuum Rating _____, @ _____ Degrees F.

6. COMMENTS _____

CEDAR CHEMICAL CORPORATION
CASH FLOW SCHEDULE
W. R. GRACE & CO. INC. PROJECT
EXHIBIT F

ITEM	DESCRIPTION	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	ENGINEERING	\$50,000	\$60,000	\$40,000	\$10,000						\$160,000
2	BOND	\$50,000									\$50,000
3	CONSTRUCTION MANAGEMENT		\$5,000	\$5,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$70,000
4	PUMPS [8]		\$5,000	\$10,000	\$240,000						\$255,000
5	HYDROGEN REACTOR [1]	\$125,000		\$15,000	\$10,000				\$5,000		\$155,000
6	REACTORS AND VESSELS [13]		\$10,000	\$40,000	\$5,000						\$55,000
7	TANKS [26]		\$30,000	\$150,000	\$20,000						\$200,000
8	AGITATORS [7]			\$15,000	\$10,000	\$5,000			\$5,000		\$35,000
9	FILTERS [6]				\$20,000	\$5,000			\$5,000		\$30,000
10	HEAT EXCHANGERS [11]		\$5,000	\$20,000	\$5,000						\$30,000
11	CENTRIFUGE [1]	\$25,000	\$50,000		\$5,000					\$5,000	\$85,000
12	DRYER [1]	\$20,000		\$70,000						\$5,000	\$5,000
13	CONCRETE		\$40,000	\$50,000	\$5,000						\$95,000
14	STEEL		\$10,000	\$90,000	\$50,000	\$10,000					\$160,000
15	CRANE		\$5,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$15,000
16	PIPING					\$50,000	\$160,000	\$80,000	\$70,000	\$60,000	\$25,000
17	INSTRUMENTS			\$5,000	\$120,000	\$80,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
18	ELECTRICAL		\$5,000			\$40,000	\$60,000	\$20,000	\$15,000	\$20,000	\$20,000
19	INSULATION								\$30,000	\$30,000	\$30,000
20	PAINT								\$5,000	\$10,000	\$10,000
21	MISC. & RETAINAGE		\$5,000	\$10,000	\$10,000	\$10,000	\$25,000	\$25,000	\$25,000	\$25,000	\$180,000
TOTALS		\$270,000	\$230,000	\$540,000	\$540,000	\$230,000	\$295,000	\$175,000	\$210,000	\$205,000	\$305,000

\$3,000,000



EXHIBIT G
PRIME CONTRACTOR SCOPE OF WORK

1985 Nonconah Blvd. • Memphis, TN 38132 (901) 398-5151 or 398-5152

March 6, 1989

Mr. Geoffry Pratt
Cedar Chemical Corporation
5100 Poplar Avenue
Suite 2414
Memphis, Tennessee 38137

REFERENCE: W.R. Grace Nitroparaffins Project

Gentlemen:

In accordance with your requirements for the engineering design and construction of modifications to your existing facility at West Helena, Arkansas, we are pleased to present, herewith, our Lump Sum Fee in the amount of Two Million Nine Hundred Eighty-Nine Thousand Seven Hundred Sixty Dollars (\$2,989,760.00). For this sum, Delta shall function as the overall Prime Contractor providing all design engineering services, equipment selection, inspection of used equipment, procurement of new equipment and material, and construction services, using sub-contractors to Delta for the various construction disciplines. We will, in all cases, be responsible for the overall management and supervision of our own and sub-contractor forces and activities.

Our contractual agreement provides for the level of effort and manpower necessary to accomplish all the work in the attached "Scope of Work". To accommodate Cedar's requirement of a Plant Start-Up within nine (9) months after the authorization to proceed, Delta will provide engineering and construction services in accordance with the Project Schedule which is attached. To this end, we will exercise due diligence and be bound by the terms of the Contract.

Delta has prepared to dedicate the services of Jim Fowler as its Project Manager for the entire project. The engineering and construction management shall be accomplished by:

- One (1) ----- Chemical Engineer
- Three (3) --- Mechanical Engineers
- One (1) ----- Electrical Engineer
- One (1) ----- Structural Engineer
- One (1) ----- Architectural-Structural Designer
- Three (3) --- Vessel-Piping Designers
- One (1) ----- Electrical Designer
- One (1) ----- Cost Accounting & Secretary
- CAD System All Drafting

Page Two
Cedar Chemical Corp.
February 20, 1989

Our staff has the capability and will provide all:

- Site survey and field measurements
- Grading plans
- Foundation and concrete design
- Architectural design
- Structural steel design
- Equipment plans and elevations
- Piping plans and elevations
- Instrumentation design and details
- Electrical design - distribution, power, and control
- Bills of materials
- Pressure vessel design
- Contractor bid packages
- Specialty designs
- Engineered equipment procurement
- On-site construction project management
- Field engineering
- Expediting and coordination functions
- Milestone and progress reports
- Project cost accounting
- Clerical requirements
- Equipment records and documentation
- Other engineering services required to meet project objectives

As our schedule indicates, we based our level of effort on a time frame of twelve (12) weeks for the accomplishment of the engineering work. We would also be furnishing concurrently, on-site supervision for site-civil construction as early as _____ and full time project management as of _____ to accommodate the fast-track schedule.

The actual construction, under Delta's total responsible supervision, will be accomplished by various sub-contractors with expertise in their respective discipline. The sub-contractors and their subdivision of work are listed in the attached Contractor Schedule.

As it specifically relates to this project, a fully executed "Secrecy Agreement" dated March 8, 1988 is on file.

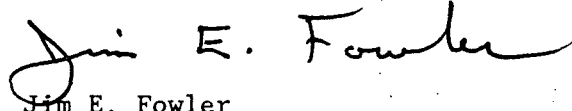
Delta's joint involvement with Cedar and W.R. Grace during the developmental stages of this project, coupled with the fact that we designed the original facility in 1975, gives us an intimate knowledge of and long-term experience which will be most beneficial for all parties concerned. We have a complete understanding of the "Scope of Work". Based on our recent

Page Three
Cedar Chemical Corp.
February 20, 1989

experience and involvement with this project and our past record of accomplishing "Turnkey Projects", we shall provide an efficient engineering design and provide the management skills necessary for a timely, on budget construction contract.

Respectfully,

Delta Process Management, Inc.

A handwritten signature in cursive script that reads "Jim E. Fowler". The signature is written in dark ink and is positioned above the printed name and title.

Jim E. Fowler
President

/kh
Enclosure

GENERAL PROJECT DESCRIPTION

The "Nitroparaffin Derivatives Project" involves the construction of modifications to an existing idle facility and the engineering design necessary to accomplish the construction. All of this work shall be done for Cedar Chemical Corporation at its manufacturing facility in West Helena, Arkansas. The project shall be done under one contract with Delta Process Management, Inc. as the Prime Contractor providing all engineering and construction.

In general, Delta shall design and build the modified unit utilizing the attached:

1. Process Flow Diagrams (7)
2. Process & Instrument Diagrams (11)
3. Equipment List I (relocated equipment from Vicksburg Plant)
4. Equipment List II (West Helena Plant equipment)
5. Equipment List III (New & Used equipment to be procured for the project by Delta)
6. All structural steel, foundations, pipe, valves, fittings, switch-gear, and controls necessary for an operable facility.

W.R. Grace will provide the process design. The original "plans" with the approval signature of Grace's representative shall be the only basis for Delta's engineering design and shall be the controlling document as it relates to Delta's contract. Those approved plans were received by Delta on February 13, 1989, and will be retained by Delta until completion of the Contract.

The specifics for the Prime Contract are outlined in the Scope of Work.

SCOPE OF WORK

1. Under one contract, provide engineering, construction and installation work on Cedar Chemical Corporation Plant at West Helena, Arkansas to modify existing idle facilities to manufacture nitroparaffin derivatives utilizing those processes developed and owned by W.R. Grace and Company.
2. Provide required number of plant visits and review meetings with Cedar and Grace personnel during engineering design.
3. Provide manpower qualified to conduct site surveying and field measurements which shall be used in detail design. Establish horizontal and vertical controls which shall be available when construction shall commence.
4. Determine the timing of the various phases of construction, define work to the various sub-contractors, and set schedule such that the project may be completed by _____.
5. Determine the availability of existing sub-surface soil investigation data or present basis for the maximum design loading's of footings and foundations.
6. Provide a grading and fill plan with details for the planned construction site. This shall include a survey and topographical plan to allow for the drainage design associated with new sites for Hydrogen and Nitromethane storage.
7. Provide an overall site plan defining revisions to the existing fire protection system. The drawings and specifications shall be of sufficient detail to be used as construction drawings. This plan will reflect also the railroad spurs and the piperack revisions that will be required.
8. Provide all concrete foundation plans, elevations, details, and rebar schedules. Foundations are required for the following:
 - (a) Process slab revisions
 - (b) Column foundations
 - (c) Equipment piers on process slab
 - (d) Centrifuge and dryer bay
 - (e) Piperack from Hydrogen bulk storage
 - (f) Build storage pad for Nitromethane drums
 - (g) Piperack from Nitropropane rail spots
 - (h) Process slab addition on the East end of unit
 - (i) Centrifuge operating level
 - (j) Miscellaneous revisions within the Tank Farm
9. Provide all architectural plans, elevations, details, and material schedules for the masonry and concrete work required for revision and construction of the control room and Motor Control Center.

10. Provide all design and furnish plans and elevations of the existing structural steel and the necessary revisions for equipment support, stairs, ladders, handrails, piperacks, and equipment frames. We shall also detail and have fabricated to the extent as practicable for the assembly of the beams and columns by means of field bolting. Some of the structure, by necessity, will be field welded.
11. Provide design and fabrication of T-216 Nickel I.X. Waste Tank.
12. Implement the piping and controls as designed from the Process and Instrumentation Diagrams. Furnish all proper materials of construction as it relates to pipe, valves, fittings, controls, and equipment. The project equipment, instruments, and specialty items will be tabulated in a computerized printout list for use during construction, subsequent operator training and operations.
13. Prepare the necessary plans and elevations of equipment to complete architectural, site, structural, piping, instrumentation, and electrical designs. We shall also design and construct with the intent of future equipment additions and expansions.
14. Confirm the required operating capacities, style, material of construction, flushing, and seal requirements of all pumps and mechanical equipment. Specify and procure. Include these new equipment items in the computerized equipment list.
15. Certain process vessels will be removed from idle facilities at the Vicksburg Plant. After the equipment has been suitably cleaned and inspected, and has passed cleanliness criteria, established by Grace, we shall properly remove and transport the equipment to West Helena for modification and reinstallation. We shall confirm all dimensional data provided, or verify by field measurement where drawings are not available, the fit in the unit and nozzle orientation for the piping design.
16. We shall complete the heat transfer analysis and provide the design drawings and calculations for the procurement of the heat exchangers and condensers. Procure and install.
17. Provide a complete piping design with double-line plans, elevations and details in sufficient detail to allow our mechanical subcontractor to encounter no difficulty in field erection and drawing interpretation. Our design shall include bills of materials, specifications, and line lists so the proper materials of construction will be used in the appropriate service. We shall include expansion joint design in steam service, hot insulation and cold insulation details, and specifications for both piping and vessels, and detail methods of hanging and bracing of piping. The piping shall include details of instrumentation process connections, instrument air supply piping, and instrument signal tubing to and from instruments and control room.

Details shall be made showing tie-ins of piping into existing utility services and their routing from off-sites to the Unit. This piping involves:

- a. Plant instrument air
- b. Nitrogen
- c. Steam
- d. Cooling water
- e. Potable water
- f. Effluent header
- g. Fire water

The piping design shall include isometric projections of assemblies that are not clear from plan or elevation drawings because of crowding or depth of the view.

18. Provide a complete set of loop diagrams for field and panel mounted instruments. This shall include both electronic and pneumatic instrumentation. Delta shall prepare an instrument layout plan and design of a Control Panel which we shall install in the Control Room. We shall include calculations for the sizing and specification of control valves for flow, pressure, and temperature control. The instruments will all be of the same manufacture where practicable and will be of the most current technology as it most appropriately relates.
19. Provide a complete electrical design that shall also include plans and elevations for the Motor Control Center and the new switchgear to be furnished and installed. The majority of the wiring shall be done in accordance with Class I, Groups C and D, Division I classification. We shall determine, specify, and furnish the type and quantity of starters required for the unit. Some switchgear will be available from the existing MCC and will be used. The remaining switchgear requirement shall be determined, and be provided for installation complete with nameplate legends, heater and fuse sizes, etc. The electrical plans and elevations shall include the following:
 - (a) electrical one line diagrams
 - (b) grounding plan for process unit, Hydrogen bulk storage and Nitromethane bulk storage
 - (c) conduit plan
 - (d) motor control center details
 - (e) control room power and lighting plans and details
 - (f) process area power plan
 - (g) electrical control circuits and interlocks
 - (h) control panel details
 - (i) railroad and tank farm power plan
 - (j) railroad and tank farm lighting plan
 - (k) Hydrogen bulk storage lighting plan
 - (l) Nitromethane bulk storage lighting plan

Page Four
SCOPE OF WORK

- (m) lighting plans and details
- (n) control room - MCC HVAC and Pressurization

All construction shall be done in accordance with the most recent issue of the National Electrical Code and all local and state requirements.

20. Delta shall prepare bid package documents that it shall use to acquire the most qualified sub-contractors; and which shall also be the means whereby we will be able to provide the most effective means of cost control for ourselves and ultimately for Cedar Chemical. We anticipate preparing the following bid packages:

- (a) Site preparation - grading and drainage
- (b) Foundations - all concrete and masonry
- (c) Structural - steel fabrication and delivery
- (d) Erection - steel revisions and erection
- (e) Mechanical - equipment setting, piping, milwright
- (f) Instrumentation - instrument installation, calibrate
- (g) Fabrication - tanks, vessels, modifications
- (h) Insulation - vessels and piping
- (i) Painting - structure touchup, masonry
- (j) Equipment - pumps, tanks, controls, valves, pipe

These documents shall include all necessary drawings, specifications, equipment list, specialty list, instrument list, line list, bills of material where applicable, and the specifications that are pertinent. Our bid documents include the following:

- (a) introductory cover letter
- (b) instructions to bidders
- (c) services to be provided by the sub-contractor
- (d) services to be provided by Cedar
- (e) general description of service, equipment, or work
- (f) detailed scope of work or specification
- (g) safety guidelines for sub-contractor
- (h) maintenance of records or submittals
- (i) Delta Engineering Standards
- (j) sample lump sum contract

21. Provide sub-contractors to accomplish all site and civil construction.
22. Provide sub-contractors to accomplish the removal and transportation of all qualified process equipment from the Vicksburg plant to the West Helena Plant and make any necessary revisions, modifications, or repairs.
23. Provide sub-contractors to accomplish the removal and relocation of any process equipment presently installed at the West Helena Plant to the proper location in the Unit to be modified.

Page Five
SCOPE OF WORK

24. Provide the mechanical sub-contractors to erect all steel and set the equipment in the Unit.
25. Provide the mechanical sub-contractors to completely install all process piping, controls, instrumentation and all that is required to complete and make the Unit ready for operations after we have tested and certified its readiness.
26. Provide the electrical sub-contractors to completely install all power, lighting, and electrical controls.
27. Provide the insulation sub-contractors to fully insulate the piping and pertinent process equipment.
28. Provide the painting sub-contractors necessary to accomplish any touch-up painting of the structural steel, etc.
29. Provide a thorough and complete site cleanup prior to the start-up of operations.
30. Provide on-site project management for field engineering, construction supervision, progress reports, and project liaison with Cedar and Grace personnel.
31. Provide inspections of all used or relocated equipment in accordance with our Engineering Inspection Checklist. This procedure will be used by Delta to assure ourselves that, in terms of good engineering practice and judgement, the selection of a tank or vessel is visually acceptable for the intended use in this project. Short of extensive and quite expensive non-destructive testing procedures, this will be an assertion that the equipment appears to be sound and usable in the project.
32. Delta will furnish suitable other used equipment in lieu of those vessels that were selected from the Vicksburg equipment in the event they fail to pass the inspection or can not properly be cleaned. The Contract fee will be adjusted by the amount that each equipment item was listed in the original estimate of which Cedar has copies on record.
33. Delta will furnish all equipment as listed in the respective Equipment Lists either by relocation or acquisition. Delta's fee does not reflect the cost of the value Cedar internally assigns to its own equipment. Our fee has been reduced by the amount we assigned to each vessel as was originally set out in the cost estimate, as it relates to the use of 28 items from the Vicksburg Plant.
34. Delta shall not be responsible for the Lease associated with the bulk Hydrogen equipment or the Carbon Columns.

Page Six
SCOPE OF WORK

35. Delta shall not be responsible for acquiring any Operating Permits or Pollution Permits from either Federal EPA or the Arkansas Department of Pollution Control and Ecology.
36. Delta shall not be responsible for the removal or disposal of any insulation or chemical contamination associated with the used equipment to be relocated.
37. Delta shall not be responsible for operator training or start-up assistance under this contract.

CONTRACTOR SCHEDULE
CEDAR-GRACE PROJECT

(1) Site & Earthwork	Helena Contracting Company
(2) Foundations	Gary Greene Construction G & H Construction Chris Woods Construction
(3) Structural Steel	Russelville Steel Wilson Steel Lindberg Steel
(4) Erection of Steel	Continental Construction Trumbo, Inc. Plant Maintenance Service Corp. D & J Metal Products
(5) Mechanical & Piping	Trumbo, Inc. Plant Maintenance Service Corp. Mid-South Maintenance D & J Metal Products
(6) Instrumentation	Creative Controls Southland Electric
(7) Electrical	Southland Electric Dunlap Electric Ervin Electric American Electric
(8) Insulation	Insulation & Refractories Services Young Sales Industrial Insulation
(9) Painting	McConnell & Johnson
(10) Tanks & Vessels	Trumbo, Inc. Mid-South Maintenance Plant Maintenance Service Corp. D & J Metal Products
(11) Pumps	Durco, Goulds, Dean, LaB Roper, Viking, Palsa, Eco
(12) Valves	Durco, Jamesbury, Crane Fisher

GRACE

Organic Chemicals Division
W.R. Grace & Co.
55 Hayden Avenue
Lexington, Mass. 02173

MATERIAL SAFETY DATA

EMERGENCY TELEPHONE NO: 713 - 479 - 7348

SECTION ONE - PRODUCT DESCRIPTION

IDENTITY: Nitromethane

MSDS DATE: 05-13-87

SYNONYMS: Nitrocarbinol, NM

CHEMICAL FORMULA: CH_3NO_2

CAS Number: 75-52-5

TSCA LISTING: This product is listed in the TSCA inventory.

SECTION TWO - HAZARDOUS INGREDIENTS

CHEMICAL NAME [CAS NUMBER]	PERCENT PRESENT	TLV*	PEL
Nitromethane [75-52-5]	>95	100 ppm TWA	100 ppm TWA
Nitroethane [79-24-3]	<3	100 ppm TWA	100 ppm TWA
1-Nitropropane [108-03-2]	<0.5	25 ppm TWA	25 ppm TWA
2-Nitropropane [79-46-9]	<1	10 ppm TWA	25 ppm TWA

*Also Grace Internal Limit unless otherwise specified

N.A. = Not applicable

N.E. = None established

NAIF = No applicable information found

TLV = Threshold Limit Value
(ACGIH guideline)

PEL = Permissible Exposure Limit
(OSHA legal limit)

TWA = Time Weighted Average
for 8 hrs unless otherwise specified

C = Ceiling value

LEL = Lower Explosive Limit

UEL = Upper Explosive Limit

SECTION THREE - PHYSICAL DATA

APPEARANCE AND ODOR: Colorless liquid with mild, fruity odor.

BOILING POINT: 214°F/101°C

SPECIFIC GRAVITY: 1.139 (Water = 1)

FREEZING POINT: -20°F/-29°C

% VOLATILE BY WT.: 100

VAPOR PRESSURE: 27.8 mm Hg @ 20°C

EVAPORATION RATE: 1.8 (BuAc = 1)

VAPOR DENSITY: 2.1 (Air = 1)

WATER SOLUBILITY: 9.5% wt @ 20°C

The information contained herein is based upon data considered true and accurate. However, Grace makes no warranties, express or implied, as to the accuracy or adequacy of the information contained herein. The results to be obtained from the use thereof. This information is offered solely for the user's consideration, investigation and verification. Since the use and conditions of use of this information and the material described herein are not within the control of Grace, Grace assumes no responsibility for injury to the user or third persons. The material described herein is sold only pursuant to Grace's Terms and Conditions of Sale, including those limiting warranties and remedies contained therein. It is the responsibility of the user to determine whether any use of this data and information is in accordance with applicable federal, state and local laws and regulations.

SECTION FOUR - FIRE FIGHTING DATA

NFPA Ratings (applicable to fire fighting situations only): Health -1, Flammability-3, Reactivity-3

FLASH POINT: 95°F/35C

METHOD: Closed Cup

FLAMMABLE LIMIT - LEL: 7.3%

UEL: Unknown

APPROXIMATE IGNITION TEMPERATURE: 785°F/418C

EXTINGUISHING MEDIA: Water, foam, carbon dioxide, and Halon system. Use only the Triclass type dry chemical extinguishers for classes A, B, & C. Use of other dry chemical extinguishers will cause re-ignition of the fire.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus. Fight fires from an explosion-resistant location. Cool drums and tanks with water spray and continue to cool after fire has been extinguished. Stay upwind and out of low areas. If tank or truck is involved in a fire, isolate for $\frac{1}{2}$ mile in all directions.

UNUSUAL FIRE & EXPLOSION HAZARDS: Flammable liquid. Combustion products may contain nitrogen oxides or carbon oxides. Vapor is heavier than air and may travel a considerable distance to ignition source and flashback. Decomposes explosively at critical temperature of 599°F and critical pressure of 915 psig.

SECTION FIVE - HEALTH & FIRST AID DATA

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH: 1000 ppm.

PRIMARY ROUTES OF EXPOSURE: Inhalation of mist or vapor. Eye and skin contact.

WARNING PROPERTIES: Strong >100 ppm and irritating at 200 ppm. Not considered to have good warning properties.

HEALTH HAZARDS (ACUTE AND CHRONIC): Oral LD₅₀ for rats is 1210 mg/kg. Irritating to eyes. Repeated exposure has caused mild skin irritation due to defatting effects. Animal studies produced respiratory tract irritation with breathing difficulties that may be delayed in onset. Weak narcotic. Chronic exposure of animals indicates some liver and kidney injury. No effects attributable to NM have been reported in humans.

CARCINOGENICITY: Based on animal studies 2-nitropropane, a component, has been listed by IARC and NTP as a suspect carcinogen but is not listed by OSHA. Other components are not listed by NTP, IARC, or OSHA as suspect or proven carcinogens.

SIGNS & SYMPTOMS OF OVEREXPOSURE: Weakness, incoordination, dizziness, narcosis, convulsions. Burning, soreness in nose, throat, or lungs.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Persons with pre-existing lung conditions may be more susceptible to irritation effects. Persons with impaired liver function may be more susceptible to effects caused by liver damage.

EMERGENCY AND FIRST AID PROCEDURES:

Eye Contact: Immediately flush with large quantities of water for at least 15 minutes while holding the eyelids open. Contact a physician immediately.

Skin Contact: Immediately remove contaminated clothing and flush area with large quantities of water for at least 15 minutes. Contact a physician if irritation develops.

Ingestion: Induce vomiting if patient is conscious. Do not induce vomiting in an unconscious patient. Contact a physician immediately.

Inhalation: Remove from contaminated atmosphere. If breathing has stopped, give artificial respiration then oxygen if needed. Contact a physician immediately. Effects of inhalation overexposure may not be immediately obvious.

SECTION SIX - REACTIVITY DATA

STABILITY: Stable at normal temperatures and pressures. Unstable at elevated temperatures and pressure.

CONDITIONS TO AVOID: Decomposes explosively at critical temperature of 599°F and critical pressure of 915 psig. Can be detonated by shock from high explosives, or by heat if under strong confinement. Mixing with amines, acids, or certain other chemical compounds will cause NM to become more sensitive to detonation.

INCOMPATIBILITY WITH OTHER MATERIALS: Amines, strong acids, alkalies (lye, caustic), strong oxidizers, metal oxides, hydrocarbons, and other combustible materials. Lead, copper, and their alloys.

HAZARDOUS DECOMPOSITION PRODUCTS: Nitrogen oxides, carbon oxides.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID UNCONTROLLED POLYMERIZATION: N.A.

SECTION SEVEN - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN TO HANDLE SPILLS OR RELEASES: Evacuate area of nonessential personnel. Ventilate area. Eliminate ignition sources. No flames, sparks or flares allowed in spill area. Vapor may collect in low areas or travel a considerable distance to ignition source and flash back. Prevent from entering drinking water supplies or streams. Collect with non-combustible absorbent material and package for disposal according to local, state, and federal regulations.

WASTE DISPOSAL PROCEDURES: When disposing of pure product as a waste according to EPA regulation 40 CFR 261 classify and label as follows:

DOT Name and Number = Waste Nitromethane, UN1261

EPA Name and Number= Ignitable, D001

SECTION EIGHT - SPECIAL PROTECTION INFORMATION

VENTILATION: If necessary, appropriate explosion-proof exhaust ventilation for the handling conditions is recommended. Dilution ventilation is not recommended as the sole control mechanism.

PROTECTIVE EQUIPMENT: Minimum - chemical safety goggles with side shields and impervious gloves. Do not wear contact lenses when handling chemicals. Wear impervious clothing if possibility of body contact exists.

RESPIRATORY PROTECTION: Use pressure-type full-face supplied air or self-contained breathing apparatus. Do not use cartridge-type respirators.

SECTION NINE - SPECIAL PRECAUTIONS

WORK/HYGIENIC PRACTICES: Before entering a confined space, check for vapor accumulation. Wash thoroughly after handling. Wash contaminated clothes before re-use. Launder work clothes separately from family clothes. Check protective clothing, especially impervious gloves, for leaks before use. Transfer equipment must be grounded. Do not use lye or caustic to clean drums or equipment that has contacted NM. Dry salts of inorganic bases and NM are explosive.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Store in cool, dry, and well ventilated area. Keep containers closed to maintain nitrogen blanket. Use only DOT-approved containers. Do not enter storage area unless area is adequately ventilated. Protect against physical damage. Nitromethane should be stored in a suitably isolated outdoor storage facility. Because of the explosion potential presented, every possible means should be taken to protect the storage area from exposure to external fires. Explosives and hazardous processing should not be permitted in the vicinity of the storage areas. Separate from oxidizing materials. Dry product may be stored in steel. Wet product (>0.2% water) must be stored in stainless steel or aluminum.

SECTION TEN - REGULATORY COMMENTS

Nitromethane is not a hazardous substance (40 CFR 116), toxic pollutant (40 CFR 129), or "priority pollutant" pursuant to the Federal Water Pollution Control Act, sections 311 (b)(2)(A), 307 (a).

Nitromethane is not a hazardous air pollutant (40 CFR 61) pursuant to the Clean Air Act, section 112.

Nitromethane is minimally photochemically reactive and, therefore, is classified as a solvent exempt from volume restrictions under Rule 66 of the Air Pollution Control District of Los Angeles County, Regulation 3 of the Bay Area Air Pollution Control District, or other similar pollution legislation in the United States.

GRACE

Organic Chemicals Division
W.R. Grace & Co.
55 Hayden Avenue
Lexington, Mass. 02173

MATERIAL SAFETY DATA

EMERGENCY TELEPHONE NO: 713 - 479 - 7348

SECTION ONE - PRODUCT DESCRIPTION

IDENTITY: Nitroethane

MSDS DATE: 05-13-87

SYNONYMS: NE

CHEMICAL FORMULA: $\text{CH}_3\text{CH}_2\text{NO}_2$

CAS Number: 79-24-3

TSCA LISTING: This product is listed in the TSCA inventory.

SECTION TWO - HAZARDOUS INGREDIENTS

CHEMICAL NAME [CAS NUMBER]	PERCENT PRESENT	TLV*	PEL
Nitroethane [79-24-3]	>92.5	100 ppm TWA	100 ppm TWA
2-Nitropropane [79-46-9]	< 5	10 ppm TWA	25 ppm TWA
Nitromethane [75-52-5]	< 2.5	100 ppm TWA	100 ppm TWA
1-Nitropropane [108-03-2]	< 1	25 ppm TWA	25 ppm TWA

*Also Grace Internal Limit unless otherwise specified

N.A. = Not applicable

N.E. = None established

NAIF = No applicable information found

TLV = Threshold Limit Value

PEL = Permissible Exposure Limit

(ACGIH guideline)

(OSHA legal limit)

TWA = Time Weighted Average

C = Ceiling value

for 8 hrs unless otherwise specified

LEL = Lower Explosive Limit

UEL = Upper Explosive Limit

SECTION THREE - PHYSICAL DATA

APPEARANCE AND ODOR: Colorless liquid with mild, fruity odor.

BOILING POINT: 237°F/114°C

SPECIFIC GRAVITY: 1.05 (Water = 1)

FREEZING POINT: -130°F/-90°C

% VOLATILE BY WT.: 100

VAPOR PRESSURE: 15.6 mm Hg @ 20°C

EVAPORATION RATE: 1.45 (BuAc = 1)

VAPOR DENSITY: 2.6 (Air = 1)

WATER SOLUBILITY: 4.5% wt @ 20°C

The information contained herein is based upon data considered true and accurate. However, Grace makes no warranties, express or implied, as to the accuracy or adequacy of the information contained herein or the results to be obtained from the use thereof. This information is offered solely for the user's consideration, investigation and verification. Since the use and conditions of use of this information and the material described herein are not within the control of Grace, Grace assumes no responsibility for injury to the user or third persons. The material described herein is sold only pursuant to Grace's Terms and Conditions of Sale, including those limiting warranties and remedies contained therein. It is the responsibility of the user to determine whether any use of this data and information is in accordance with applicable federal, state or local laws and regulations.

SECTION FOUR - FIRE FIGHTING DATA

NFPA Ratings (applicable to fire fighting situations only): Health -1, Flammability-3, Reactivity-3

FLASH POINT: 82°F/28C

METHOD: Closed Cup

FLAMMABLE LIMIT - LEL: 3.4%

UEL: Unknown

APPROXIMATE IGNITION TEMPERATURE: 778°F/414C

EXTINGUISHING MEDIA: Water, foam, carbon dioxide, and Halon system. Use only the Triclass type dry chemical extinguishers for classes A, B, & C. Use of other dry chemical extinguishers will cause re-ignition of the fire.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus. Fight fires from an explosion-resistant location. Cool drums and tanks with water spray and continue to cool after fire has been extinguished. Stay upwind and out of low areas. If tank or truck is involved in a fire, isolate for $\frac{1}{2}$ mile in all directions.

UNUSUAL FIRE & EXPLOSION HAZARDS: Flammable liquid. Combustion products may contain nitrogen oxides or carbon oxides. Vapor is heavier than air and may travel a considerable distance to ignition source and flashback.

SECTION FIVE - HEALTH & FIRST AID DATA

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH: 1000 ppm.

PRIMARY ROUTES OF EXPOSURE: Inhalation of mist or vapor. Eye and skin contact.

WARNING PROPERTIES: Irritating to eyes >100 ppm. Not considered to have good warning properties.

HEALTH HAZARDS (ACUTE AND CHRONIC): Oral LD₅₀ for rats is 1620 mg/kg. Irritating to eyes. Repeated exposure has caused mild skin irritation due to fatting effects. Animal studies produced respiratory tract irritation with breathing difficulties that may be delayed in onset. Weak narcotic. Chronic exposure of animals indicates some liver and kidney injury. No effects attributable to NE have been reported in humans.

CARCINOGENICITY: Based on animal studies 2-nitropropane, a component, has been listed by IARC and NTP as a suspect carcinogen but is not listed by OSHA. Other components are not listed by NTP, IARC, or OSHA as suspect or proven carcinogens.

SIGNS & SYMPTOMS OF OVEREXPOSURE: Weakness, incoordination, dizziness, narcosis, convulsions. Burning, soreness in nose, throat, or lungs.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Persons with pre-existing lung conditions may be more susceptible to irritation effects. Persons with impaired liver function may be more susceptible to effects from liver damage.

EMERGENCY AND FIRST AID PROCEDURES:

Eye Contact: Immediately flush with large quantities of water for at least 15 minutes while holding the eyelids open. Contact a physician immediately.

Skin Contact: Immediately remove contaminated clothing and flush area with large quantities of water for at least 15 minutes. Contact a physician if irritation develops.

Ingestion: Induce vomiting if patient is conscious. Do not induce vomiting in an unconscious patient. Contact a physician immediately.

Inhalation: Remove from contaminated atmosphere. If breathing has stopped, give artificial respiration then oxygen if needed. Contact a physician immediately. Effects of inhalation overexposure may not be immediately obvious.

SECTION SIX - REACTIVITY DATA

STABILITY: Stable at normal temperatures and pressure. Unstable at elevated temperatures and pressure.

CONDITIONS TO AVOID: Rapid heating to high temperatures may cause an explosion. May be detonated under very strong confinement by powerful explosives. Mixing with amines, strong alkalis, acids, or other materials may cause NE to become more unstable.

INCOMPATIBILITY WITH OTHER MATERIALS: Amines, strong acids, alkalis (lye, caustic), strong oxidizers, metal oxides, hydrocarbons, and other combustible materials. Lead, copper, and their alloys.

HAZARDOUS DECOMPOSITION PRODUCTS: Nitrogen oxides, carbon oxides.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID UNCONTROLLED POLYMERIZATION: N.A.

SECTION SEVEN - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN TO HANDLE SPILLS OR RELEASES: Evacuate area of nonessential personnel. Ventilate area. Eliminate ignition sources. No flames, sparks or flares allowed in spill area. Vapor may collect in low areas and travel a considerable distance to ignition source and flash back. Prevent from entering drinking water supplies or streams. Collect with non-combustible absorbent material and package for disposal according to local, state, and federal regulations.

WASTE DISPOSAL PROCEDURES: When disposing of pure product as a waste according to EPA regulation 40 CFR 261 classify and label as follows:

DOT Name and Number = Waste Nitroethane, No. = UN2842

EPA Name and Number = Ignitable, No. = D001

SECTION EIGHT - SPECIAL PROTECTION INFORMATION

VENTILATION: If necessary, appropriate exhaust ventilation for the handling conditions is recommended. Dilution ventilation is not recommended as the sole control mechanism.

PROTECTIVE EQUIPMENT: Minimum - chemical safety goggles with side shields and impervious gloves. Do not wear contact lenses when handling chemicals. Wear impervious clothing if possibility of body contact exists.

RESPIRATORY PROTECTION: Use pressure-type full-face supplied air or self-contained breathing apparatus. Do not use cartridge-type respirators.

SECTION NINE - SPECIAL PRECAUTIONS

WORK/HYGIENIC PRACTICES: Before entering a confined space, check for vapor accumulation. Wash thoroughly after handling. Wash contaminated clothes before re-use. Launder work clothes separately from family clothes. Check protective clothing, especially impervious gloves, for leaks before use. Transfer equipment must be grounded. Do not use lye or caustic to clean drums or equipment that has contacted NE. Dry salts of inorganic bases and NE are explosive.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Store in cool, dry, and well ventilated area. Keep containers closed to maintain nitrogen blanket. Use only DOT-approved containers. Do not enter storage area unless area is adequately ventilated. Protect against physical damage. Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Isolate the storage area from stores of other flammable liquids or gases. Explosives and hazardous processing should not be permitted in the vicinity of this storage area. Separate from oxidizing materials. Dry product may be stored in steel. Wet product (>2% water) must be stored in stainless steel or aluminum.

SECTION TEN - REGULATORY COMMENTS

Nitroethane is not a hazardous substance (40 CFR 116), toxic pollutant (40 CFR 129), or "priority pollutant" pursuant to the Federal Water Pollution Control Act, sections 311 (b)(2)(A), 307 (a).

Nitroethane is not a hazardous air pollutant (40 CFR 61) pursuant to the Clean Air Act, section 112.

Nitroethane is minimally photochemically reactive and, therefore, is classified as a solvent exempt from volume restrictions under Rule 66 of the Air Pollution Control District of Los Angeles County, Regulation 3 of the Bay Area Air Pollution Control District, or other similar pollution legislation in the United States.

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Organic Chemicals Division
W.R. Grace & Co.
55 Hayden Avenue
Lexington, Mass. 02173

MATERIAL SAFETY DATA

EMERGENCY TELEPHONE NO: 713 - 479 - 7348

SECTION ONE - PRODUCT DESCRIPTION

IDENTITY: 1-Nitropropane

MSDS DATE: 05-13-87

SYNONYMS: 1-NP

CHEMICAL FORMULA: $\text{CH}_3\text{CH}_2\text{CH}_2\text{NO}_2$

CAS Number: 108-03-2

TSCA LISTING: This product is listed in the TSCA inventory.

SECTION TWO - HAZARDOUS INGREDIENTS

CHEMICAL NAME [CAS NUMBER]	PERCENT PRESENT	TLV*	PEL
1-Nitropropane [108-03-2]	>94	25 ppm TWA	25 ppm TWA
2-Nitropropane [79-46-9]	<3	10 ppm TWA	25 ppm TWA
Nitromethane [75-52-5]	<1	100 ppm TWA	100 ppm TWA
Nitroethane [79-24-3]	<1	100 ppm TWA	100 ppm TWA

*Also Grace Internal Limit unless otherwise specified

N.A. = Not applicable

N.E. = None established

NAIF = No applicable information found

TLV = Threshold Limit Value

PEL = Permissible Exposure Limit

(ACGIH guideline)

(OSHA legal limit)

TWA = Time Weighted Average

C = Ceiling value

for 8 hrs unless otherwise specified

LEL = Lower Explosive Limit

UEL = Upper Explosive Limit

SECTION THREE - PHYSICAL DATA

APPEARANCE AND ODOR: Colorless liquid with mild, fruity odor.

BOILING POINT: 268°F/131°C

SPECIFIC GRAVITY: 1.00 (Water = 1)

FREEZING POINT: -162°F/-108°C

% VOLATILE BY WT.: 100%

VAPOR PRESSURE: 7.5 mm Hg @ 20°C

EVAPORATION RATE: 0.88 (BuAc = 1)

VAPOR DENSITY: 3.1 (Air = 1)

WATER SOLUBILITY: 1.4% wt @ 20°C

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SECTION FOUR - FIRE FIGHTING DATA

NFPA Ratings (applicable to fire fighting situations only): Health -2, Flammability-3, Reactivity-1

FLASH POINT: 96°F/36C

METHOD: Closed Cup

FLAMMABLE LIMIT - LEL: 2.2%

UEL: Unknown

APPROXIMATE IGNITION TEMPERATURE: 789°F/421C

EXTINGUISHING MEDIA: Water spray, dry chemical, foam, carbon dioxide, or Halon system.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self contained breathing apparatus. Fight fires from an explosion-resistant location. Cool drums and tanks with water spray and continue to cool after fire has been extinguished. Stay upwind and out of low areas. If tank or truck is involved in a fire, isolate for 1/2 mile in all directions.

UNUSUAL FIRE & EXPLOSION HAZARDS: Flammable liquid. Combustion products may contain nitrogen oxides or carbon oxides. Vapor is heavier than air and may travel a considerable distance to ignition source and flashback.

SECTION FIVE - HEALTH & FIRST AID DATA

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH: 2300 ppm.

PRIMARY ROUTES OF EXPOSURE: Inhalation of mist or vapor. Eye and skin contact.

WARNING PROPERTIES: Irritating to eyes > 100 ppm. Not considered to have good warning properties.

HEALTH HAZARDS (ACUTE AND CHRONIC): Oral LD₅₀ for rats is 455 mg/kg. Inhalation LC₅₀ for 6 hr. for rats is 400 ppm. Chronic exposure has caused severe liver damage and possible effects to the kidneys and heart in animals. 1-NP has caused formation of methemoglobin in animal studies. Weak narcotic and respiratory irritant. No effects attributed to 1-NP have been reported in humans except eye irritation >100 ppm.

CARCINOGENICITY: Based on animal studies 2-nitropropane, a component, has been listed by IARC and NTP as a suspect carcinogen but is not listed by OSHA. Other components are not listed by NTP, IARC, or OSHA as suspect or proven carcinogens.

SIGNS & SYMPTOMS OF OVEREXPOSURE: Headache, nausea, vomiting, diarrhea, dizziness, weakness. Burning, soreness in nose, throat, or lungs.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Persons with pre-existing lung conditions may be more susceptible to irritation effects. Persons with impaired liver function may be more susceptible to effects from liver damage.

EMERGENCY AND FIRST AID PROCEDURES:

Eye Contact: Immediately flush with large quantities of water for at least 15 minutes while holding the eyelids open. Contact a physician immediately.

Skin Contact: Immediately remove contaminated clothing and flush area with large quantities of water for at least 15 minutes. Contact a physician if irritation develops.

Ingestion: Induce vomiting if patient is conscious. Do not induce vomiting in an unconscious patient. Contact a physician immediately.

Inhalation: Remove from contaminated atmosphere. If breathing has stopped, give artificial respiration then oxygen if needed. Contact a physician immediately.

SECTION SIX - REACTIVITY DATA

STABILITY: Stable.

CONDITIONS TO AVOID: High temperatures cause decomposition. Unlike nitromethane and nitroethane, no detonations of 1-NP have been reported even under very severe test conditions. However, mixing with amines, alkalies, acids, and other materials will cause 1-NP to become unstable.

INCOMPATIBILITY WITH OTHER MATERIALS: Amines, strong acids, alkalies (lye, caustic), strong oxidizers, metal oxides, hydrocarbons and other combustible materials. Lead, copper and their alloys.

HAZARDOUS DECOMPOSITION PRODUCTS: Nitrogen oxides, carbon oxides.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID UNCONTROLLED POLYMERIZATION: N.A.

SECTION SEVEN - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN TO HANDLE SPILLS OR RELEASES: Evacuate area of nonessential personnel. Ventilate area. Eliminate ignition sources. No flames, sparks or flares allowed in spill area. Vapor may collect in low areas or travel a considerable distance to ignition source and flash back. Prevent from entering drinking water supplies or streams. Collect with non-combustible absorbent material and package for disposal according to local, state, and federal regulations.

WASTE DISPOSAL PROCEDURES: When disposing of pure product as a waste according to EPA regulation 40 CFR 261 classify and label as follows:

DOT Name and Number = Waste Nitropropane, UN2608

EPA Name and Number = Ignitable, D001

SECTION EIGHT - SPECIAL PROTECTION INFORMATION

VENTILATION: If necessary, appropriate exhaust ventilation for the handling conditions is recommended. Dilution ventilation is not recommended as the sole control mechanism.

PROTECTIVE EQUIPMENT: Minimum - chemical safety goggles with side shields and impervious gloves. Do not wear contact lenses when handling chemicals. Wear impervious clothing if possibility of body contact exists.

RESPIRATORY PROTECTION: Use pressure-type supplied air or self-contained breathing apparatus. Do not use cartridge-type respirators.

SECTION NINE - SPECIAL PRECAUTIONS

WORK/HYGIENIC PRACTICES: Before entering a confined space, check for vapor accumulation. Wash thoroughly after handling. Wash contaminated clothes before re-use. Launder work clothes separately from family clothes. Check protective clothing, especially impervious gloves, for leaks before use. Transfer equipment must be grounded. Do not use lye or caustic to clean drums or equipment that has contacted 1-NP. Dry salts of inorganic bases and 1-NP are explosive.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in cool, dry, and well ventilated area. Keep containers closed. Use only DOT-approved containers. Do not enter storage area unless area is adequately ventilated. Protect against physical damage. Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Nitropropane storage areas should be isolated from flammable liquids or gases. Explosives and hazardous processing should not be permitted in the vicinity of this storage area. Separate from oxidizing materials. Dry product may be stored in steel. Wet product (>2% water) must be stored in stainless steel or aluminum.

SECTION TEN - REGULATORY COMMENTS

1-Nitropropane is not a hazardous substance (40 CFR 116), toxic pollutant (40 CFR 129), or "priority pollutant" pursuant to the Federal Water Pollution Control Act, sections 311 (b)(2)(A), 307 (a).

1-Nitropropane is not a hazardous air pollutant (40 CFR 61) pursuant to the Clean Air Act, section 112.

1-Nitropropane is minimally photochemically reactive and, therefore, is classified as a solvent exempt from volume restrictions under Rule 66 of the Air Pollution Control District of Los Angeles County, Regulation 3 of the Bay Area Air Pollution Control District, or other similar pollution legislation in the United States.

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Organic Chemicals Division
W.R. Grace & Co.
55 Hayden Avenue
Lexington, Mass. 02173

MATERIAL SAFETY DATA

EMERGENCY TELEPHONE NO: 603 - 888 - 2320

Page: 1 of 3

SECTION ONE - PRODUCT DESCRIPTION

IDENTITY: TA-100
EXPERIMENTAL PRODUCT

MSDS DATE: 09-01-87

CHEMICAL DESCRIPTION: 1,3-Propanediol, 2-amino-2-(hydroxymethyl)-
SYNONYMS: Tris(hydroxymethyl)aminomethane; TRIS buffer; THAM; Tromethane; Talatrol

CAS Number: 77-86-1
TSCA LISTING: This product is listed in the TSCA inventory.

SECTION TWO - HAZARDOUS INGREDIENTS

CHEMICAL NAME [CAS NUMBER]	PERCENT PRESENT	TLV*	PEL
TA-100 [77-86-1]	~100	N.E.	N.E.

*Also Grace Internal Limit unless otherwise specified

N.A. = Not applicable

NAIF = No applicable information found

TLV = Threshold Limit Value
(ACGIH guideline)TWA = Time Weighted Average
for 8 hrs unless otherwise specified

LEL = Lower Explosive Limit

N.E. = None established

N.D. = Not determined

PEL = Permissible Exposure Limit
(OSHA legal limit)

C = Ceiling value

UEL = Upper Explosive Limit

SECTION THREE - PHYSICAL DATA

APPEARANCE AND ODOR: White crystalline solid with a faint, fishy odor.

BOILING POINT: N.A.

MELTING POINT: 340°F (171 C)

VAPOR PRESSURE: N.A.

VAPOR DENSITY: N.A.

WATER SOLUBILITY: 70g/100g at 25 C

BULK DENSITY: 52 lb/ft³

% VOLATILE BY WT.: N.A.

EVAPORATION RATE: N.A.

pH of 1% Solution: 10.4

SECTION FOUR - FIRE FIGHTING DATA

FLASH POINT: N.A.

FLAMMABLE LIMIT - LEL: N.A.

METHOD: N.A.

UEL: N.A.

The information contained herein is based upon data considered true and accurate. However, Grace makes no warranties, express or implied, as to the accuracy or adequacy of the information contained herein or the results to be obtained from the use thereof. This information is offered solely for the user's consideration, investigation and verification. Since the use and conditions of use of this information and the material described herein are not within the control of Grace, Grace assumes no responsibility for injury to the user or third persons. The material described herein is sold only pursuant to Grace's Terms and Conditions of Sale, including those limiting warranties and remedies contained therein. It is the responsibility of the user to determine whether any use of this data and information is in accordance with applicable federal, state or local laws and regulations.

EXTINGUISHING MEDIA: Water, dry chemical, carbon dioxide, foam.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self contained breathing apparatus with full face-piece. Use water spray to cool fire-exposed containers.

UNUSUAL FIRE & EXPLOSION HAZARDS: Severe dusting may generate an explosion hazard.

SECTION FIVE - HEALTH & FIRST AID DATA

PRIMARY ROUTES OF EXPOSURE: Eye and skin contact. Inhalation exposure is not likely unless handling condition generates a dust.

HEALTH HAZARDS (ACUTE AND CHRONIC): Oral LD₅₀ for rabbits is 1000 mg/kg - expected to be slightly toxic by ingestion. Due to pH may be irritating to eyes and skin. Inhalation of dust may be irritating to the respiratory tract.

CARCINOGENICITY: This material is not listed by NTP, IARC, or OSHA as a suspect or proven carcinogen. There is no evidence that indicates the material may be carcinogenic to humans or animals.

SIGNS & SYMPTOMS OF OVEREXPOSURE: Redness, burning, tearing of eyes. Red, swollen, or inflamed skin. Coughing, wheezing, chest tightness.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Persons with pre-existing skin or lung disorders may be more susceptible to the irritating properties of the material.

EMERGENCY AND FIRST AID PROCEDURES:

Eye Contact: Immediately flush with large quantities of water for at least 15 minutes while holding the eyelids open. Do not attempt to neutralize with chemical agents. Contact a physician immediately.

Skin Contact: Immediately remove contaminated clothing and flush area with large quantities of water for at least 15 minutes. Do not attempt to neutralize with chemical agents. Contact a physician immediately.

Ingestion: If conscious, give large quantities of water to drink. Do not induce vomiting. Do not give an unconscious person anything by mouth. Contact a physician immediately.

Inhalation: Remove from contaminated atmosphere. If breathing has stopped, give artificial respiration then oxygen if needed. Contact a physician immediately.

SECTION SIX - REACTIVITY DATA

STABILITY: Stable.

CONDITIONS TO AVOID: N.A.

INCOMPATIBILITY WITH OTHER MATERIALS: Oxidizing materials.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide, nitrogen oxides.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID UNCONTROLLED POLYMERIZATION: N.A.

SECTION SEVEN - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN TO HANDLE SPILLS OR RELEASES: Evacuate area of nonessential personnel. Ventilate area. Prevent from entering drinking water supplies or streams. Collect and package for disposal according to local, state, and federal regulations.

WASTE DISPOSAL PROCEDURES: Check the as is pH. If above 12.5 classify and label as follows:

EPA Name: Corrosive.....No. = D002

SECTION EIGHT - SPECIAL PROTECTION INFORMATION

VENTILATION: If necessary, appropriate exhaust ventilation for the handling conditions is recommended. Dilution ventilation is not recommended as the sole control mechanism.

PROTECTIVE EQUIPMENT: Minimum - chemical safety goggles with side shields and impervious gloves. Do not wear contact lenses when handling chemicals. Wear impervious clothing if possibility of body contact exists.

RESPIRATORY PROTECTION: Use a toxic dust respirator within use limitations. In all other situations use self-contained breathing apparatus.

SECTION NINE - SPECIAL PRECAUTIONS

WORK/HYGIENIC PRACTICES: Wash thoroughly after handling. Wash contaminated clothes before re-use. Launder work clothes separately from family clothes. Check protective clothing, especially impervious gloves, for leaks before use.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Do not store near oxidizing materials. Store in cool, dry, and well ventilated area. Keep containers closed. Use only DOT-approved containers. Do not enter storage area unless area is adequately ventilated.

GRACE

Organic Chemicals Division
W.R. Grace & Co.
55 Hayden Avenue
Lexington, Mass. 02173

MATERIAL SAFETY DATA

EMERGENCY TELEPHONE NO: 603 - 888 - 2320

Page: 1 of 3

SECTION ONE - PRODUCT DESCRIPTION

IDENTITY: AMP-95
EXPERIMENTAL PRODUCT

MSDS DATE: 09-01-87

CHEMICAL DESCRIPTION: 1-Propanol, 2-amino-2-methyl-
SYNONYMS: Isobutanol-2-amine

CAS Number: 124-68-5
TSCA LISTING: This product is listed in the TSCA inventory.

SECTION TWO - HAZARDOUS INGREDIENTS

CHEMICAL NAME [CAS NUMBER]	PERCENT PRESENT	TLV*	PEL
AMP-95 [124-68-5]	~95	N.E.	N.E.

*Also Grace Internal Limit unless otherwise specified

N.A. = Not applicable

NAIF = No applicable information found

TLV = Threshold Limit Value
(ACGIH guideline)

TWA = Time Weighted Average
for 8 hrs unless otherwise specified

LEL = Lower Explosive Limit

N.E. = None established

N.D. = Not determined

PEL = Permissible Exposure Limit
(OSHA legal limit)

C = Ceiling value

UEL = Upper Explosive Limit

SECTION THREE - PHYSICAL DATA

APPEARANCE AND ODOR: Colorless liquid with a faint, fishy odor.

BOILING POINT: ~ same as water

MELTING POINT: N.A.

VAPOR PRESSURE: ~ same as water

VAPOR DENSITY: ~ same as water

WATER SOLUBILITY: Completely miscible

SPECIFIC GRAVITY: 0.94

% VOLATILE BY WT.: 5% as water

EVAPORATION RATE: ~ same as water

pH of 1% Solution: 13.0

SECTION FOUR - FIRE FIGHTING DATA

FLASH POINT: >200°F -aqueous

FLAMMABLE LIMIT - LEL: N.D.

METHOD: N.D.

UEL: N.D.

The information contained herein is based upon data considered true and accurate. However, Grace makes no warranties, express or implied, as to the accuracy or adequacy of the information contained herein or the results to be obtained from the use thereof. This information is offered solely for the user's consideration, investigation and verification. Since the use and conditions of use of this information and the material described herein are not within the control of Grace, Grace assumes no responsibility for injury to the user or third persons. The material described herein is sold only pursuant to Grace's Terms and Conditions of Sale, including those limiting warranties and remedies contained therein. It is the responsibility of the user to determine whether any use of this data and information is in accordance with applicable federal, state or local laws and regulations.

EXTINGUISHING MEDIA: Water, dry chemical, carbon dioxide, foam.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self contained breathing apparatus with full face-piece. Use water spray to cool fire-exposed containers.

UNUSUAL FIRE & EXPLOSION HAZARDS: None.

SECTION FIVE - HEALTH & FIRST AID DATA

PRIMARY ROUTES OF EXPOSURE: Eye and skin contact. Inhalation exposure is not likely unless material is heated.

HEALTH HAZARDS (ACUTE AND CHRONIC): Oral LD₅₀ for rats is 2300 mg/kg - expected to be slightly toxic by ingestion. Due to pH may be irritating to eyes and skin. Inhalation of heated vapor or a mist may be irritating to the respiratory tract.

CARCINOGENICITY: This material is not listed by NTP, IARC, or OSHA as a suspect or proven carcinogen. There is no evidence that indicates the material may be carcinogenic to humans or animals.

SIGNS & SYMPTOMS OF OVEREXPOSURE: Redness, burning, tearing of eyes. Red, swollen, or inflamed skin. Coughing, wheezing, chest tightness.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Persons with pre-existing skin or lung disorders may be more susceptible to the irritating properties of the material.

EMERGENCY AND FIRST AID PROCEDURES:

Eye Contact: Immediately flush with large quantities of water for at least 15 minutes while holding the eyelids open. Do not attempt to neutralize with chemical agents. Contact a physician immediately.

Skin Contact: Immediately remove contaminated clothing and flush area with large quantities of water for at least 15 minutes. Do not attempt to neutralize with chemical agents. Contact a physician immediately.

Ingestion: If conscious, give large quantities of water to drink. Do not induce vomiting. Do not give an unconscious person anything by mouth. Contact a physician immediately.

Inhalation: Remove from contaminated atmosphere. If breathing has stopped, give artificial respiration then oxygen if needed. Contact a physician immediately.

SECTION SIX - REACTIVITY DATA

STABILITY: Stable.

CONDITIONS TO AVOID: N.A.

INCOMPATIBILITY WITH OTHER MATERIALS: Oxidizing materials.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide, nitrogen oxides.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID UNCONTROLLED POLYMERIZATION: N.A.

SECTION SEVEN - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN TO HANDLE SPILLS OR RELEASES: Evacuate area of nonessential personnel. Ventilate area. Prevent from entering drinking water supplies or streams. Collect with absorbent material and package for disposal according to local, state, and federal regulations.

WASTE DISPOSAL PROCEDURES: Check the as is pH. If above 12.5 classify and label as follows:

EPA Name: Corrosive.....No. = D002

SECTION EIGHT - SPECIAL PROTECTION INFORMATION

VENTILATION: If necessary, appropriate exhaust ventilation for the handling conditions is recommended. Dilution ventilation is not recommended as the sole control mechanism.

PROTECTIVE EQUIPMENT: Minimum - chemical safety goggles with side shields and impervious gloves. Do not wear contact lenses when handling chemicals. Wear impervious clothing if possibility of body contact exists.

RESPIRATORY PROTECTION: Use an approved organic vapor respirator within use limitations. In all other situations use self-contained breathing apparatus.

SECTION NINE - SPECIAL PRECAUTIONS

WORK/HYGIENIC PRACTICES: Wash thoroughly after handling. Wash contaminated clothes before re-use. Launder work clothes separately from family clothes. Check protective clothing, especially impervious gloves, for leaks before use.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Do not store near oxidizing materials. Store in cool, dry, and well ventilated area. Keep containers closed. Use only DOT-approved containers. Do not enter storage area unless area is adequately ventilated.

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MATERIAL SAFETY DATA

EMERGENCY TELEPHONE NO: 603 - 888 - 2320

Page: 1 of 3

SECTION ONE - PRODUCT DESCRIPTION

IDENTITY: 2-AB
EXPERIMENTAL PRODUCT

MSDS DATE: 09-01-87

CHEMICAL DESCRIPTION: 2-Amino-1-butanol

SYNONYMS: 2-Aminobutan-1-ol; butanol-2-amine; D,L-2-amino-1-butanol; (±)2-amino-1-butanol

CAS Number: 96-20-8

TSCA LISTING: This product is listed in the TSCA inventory.

SECTION TWO - HAZARDOUS INGREDIENTS

CHEMICAL NAME [CAS NUMBER]	PERCENT PRESENT	TLV*	PEL
2-Amino-1-butanol [96-20-8]	~100	N.E.	N.E.

*Also Grace Internal Limit unless otherwise specified

N.A. = Not applicable

NAIF = No applicable information found

TLV = Threshold Limit Value
(ACGIH guideline)TWA = Time Weighted Average
for 8 hrs unless otherwise specified

LEL = Lower Explosive Limit

N.E. = None established

N.D. = Not determined

PEL = Permissible Exposure Limit
(OSHA legal limit)

C = Ceiling value

UEL = Upper Explosive Limit

SECTION THREE - PHYSICAL DATA

APPEARANCE AND ODOR: Pale yellow liquid with a faint, fishy odor.

BOILING POINT: 352°F/178 C

MELTING POINT: N.A.

VAPOR PRESSURE: 7.5 mm Hg @ 25 C

VAPOR DENSITY: ~3.06

WATER SOLUBILITY: Completely miscible

SPECIFIC GRAVITY: 0.94

% VOLATILE BY WT.: N.A.

EVAPORATION RATE: N.D.

pH of 1% Solution: 11.1

SECTION FOUR - FIRE FIGHTING DATA

FLASH POINT: 193°F (89 C)

FLAMMABLE LIMIT - LEL: N.D.

METHOD: Closed Cup

UEL: N.D.

The information contained herein is based upon data considered true and accurate. However, Grace makes no warranties, express or implied, as to the accuracy or adequacy of the information contained herein or the results to be obtained from the use thereof. This information is offered solely for the user's consideration, investigation and verification. Since the use and conditions of use of this information and the material described herein are not within the control of Grace, Grace assumes no responsibility for injury to the user or third persons. The material described herein is sold only pursuant to Grace's Terms and Conditions of Sale, including those limiting warranties and remedies contained therein. It is the responsibility of the user to determine whether any use of this data and information is in accordance with applicable federal, state or local laws and regulations.

EXTINGUISHING MEDIA: Water, dry chemical, carbon dioxide, foam.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self contained breathing apparatus with full face-piece. Use water spray to cool fire-exposed containers.

UNUSUAL FIRE & EXPLOSION HAZARDS: Combustible liquid.

SECTION FIVE - HEALTH & FIRST AID DATA

PRIMARY ROUTES OF EXPOSURE: Eye and skin contact. Inhalation exposure is not likely unless material is heated or a mist is generated.

HEALTH HAZARDS (ACUTE AND CHRONIC): Oral LD₅₀ for mice is 2300 mg/kg - slightly toxic by ingestion. Due to pH may be irritating to eyes and skin. Inhalation of heated vapor or a mist may be irritating to the respiratory tract.

CARCINOGENICITY: This material is not listed by NTP, IARC, or OSHA as a suspect or proven carcinogen. There is no evidence that indicates the material may be carcinogenic to humans or animals.

SIGNS & SYMPTOMS OF OVEREXPOSURE: Redness, burning, tearing of eyes. Red, swollen, or inflamed skin. Coughing, wheezing, chest tightness.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Persons with pre-existing skin or lung disorders may be more susceptible to the irritating properties of the material.

EMERGENCY AND FIRST AID PROCEDURES:

Eye Contact: Immediately flush with large quantities of water for at least 15 minutes while holding the eyelids open. Do not attempt to neutralize with chemical agents. Contact a physician immediately.

Skin Contact: Immediately remove contaminated clothing and flush area with large quantities of water for at least 15 minutes. Do not attempt to neutralize with chemical agents. Contact a physician immediately.

Ingestion: If conscious, give large quantities of water to drink. Do not induce vomiting. Do not give an unconscious person anything by mouth. Contact a physician immediately.

Inhalation: Remove from contaminated atmosphere. If breathing has stopped, give artificial respiration then oxygen if needed. Contact a physician immediately.

SECTION SIX - REACTIVITY DATA

STABILITY: Stable.

CONDITIONS TO AVOID: N.A.

INCOMPATIBILITY WITH OTHER MATERIALS: Oxidizing materials.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide, nitrogen oxides.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID UNCONTROLLED POLYMERIZATION: N.A.

SECTION SEVEN - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN TO HANDLE SPILLS OR RELEASES: Evacuate area of nonessential personnel. Ventilate area. Prevent from entering drinking water supplies or streams. Collect with absorbent material and package for disposal according to local, state, and federal regulations.

WASTE DISPOSAL PROCEDURES: Check the as is pH. If above 12.5 classify and label as follows:

EPA Name: Corrosive.....No. = D002

SECTION EIGHT - SPECIAL PROTECTION INFORMATION

VENTILATION: If necessary, appropriate exhaust ventilation for the handling conditions is recommended. Dilution ventilation is not recommended as the sole control mechanism.

PROTECTIVE EQUIPMENT: Minimum - chemical safety goggles with side shields and impervious gloves. Do not wear contact lenses when handling chemicals. Wear impervious clothing if possibility of body contact exists.

RESPIRATORY PROTECTION: Use an approved organic vapor respirator within use limitations. In all other situations use self-contained breathing apparatus.

SECTION NINE - SPECIAL PRECAUTIONS

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